AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE OF PAGES
J	1 | 2

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO.(If applicable)
0004	10-Sep-2004	W32CS5-3329-7998	

6. ISSUED BY CODE W912EP	7. ADMINISTERED BY (If other than item 6) CODE ANTILLES
USA ENGINEER DISTRICT, JACKSONVILLE PRUDENTIAL OFFICE BLDG 701 SAN MARCO BLVD ATTN: CESAJ-CT JACKSONVILLE FL 32207-8175	ANTILLES OFFICE U.S. ARMY CORPS OF ENGINEERS (CESAJ-DS) 400 FERNANDEZ JUNCOS AVENUE SAN JUAN PR 00901-3299

8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)		
	X	9A. AMENDMENT OF SOLICITATION NO. W912EP-04-B-0010
	X	9B. DATED (SEE ITEM 11) 06-Aug-2004
		10A. MOD. OF CONTRACT/ORDER NO.
CODE FACILITY CODE		10B. DATED (SEE ITEM 13)

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

[X] The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer [ ] is extended, [X] is not extended.

Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods:
(a) By completing Items 8 and 15, and returning ______ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

**13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS.
IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.**

	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor [ ] is not, [ ] is required to sign this document and return ______ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

RIO GRANDE DE ARECIBO, PUERTO RICO FLOOD CONTROL PROJECT, RIO GRANDE DE ARECIBO CONTRACT 1

SEE ATTACHED SF 30 CONTINUATION PAGE FOR CHANGES TO THIS SOLICITATION.

BID OPENING DATE REMAINS UNCHANGED BY THIS AMENDMENT.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) TEL: EMAIL:	
15B. CONTRACTOR/OFFEROR (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY (Signature of Contracting Officer)	16C. DATE SIGNED 09-Sep-2004

EXCEPTION TO SF 30
APPROVED BY OIRM 11-84

30-105-04

STANDARD FORM 30 (Rev. 10-83)
Prescribed by GSA
FAR (48 CFR) 53.243

SF 30 CONTINUATION SHEET

1. SPECIFICATIONS:

A. Either asterisks appear before and after the line or lines where revisions have been made to the text on the enclosed revised or added pages or the text changes have been updated with additions noted with underlined text and deletions noted with line/cross-outs, and pertain only to changes made by this amendment.

B. The text changes may have necessitated reformatting of subsequent text or pages. If this is the case, those pages have also been issued as amended pages but are not marked with asterisks or underlined text and line/cross-outs.

DELETE SECTION 00010A LINE ITEMS & PRICING SCHEDULE and replace with the attached revised SECTION 00010A LINE ITEMS & PRICING SCHEDULE.

DELETE SECTION 00320 GEOTECHNICAL DATA and replace with the attached revised SECTION 00320 GEOTECHNICAL DATA.

DELETE APPENDIX 01330-A SUBMITTAL REGISTER and replace with the attached revised APPENDIX 01330-A SUBMITTAL REGISTER.

DELETE SECTION 02465 REINFORCED JET GROUTING and replace with the attached revised SECTION 02465 REINFORCED JET GROUTING.

2. **DRAWINGS:** D.O. File No. 106-38,385 dated May 2003 in 90 sheets + Cover: DELETE DRAWING Nos. 10/3, 20/8, 30/8, 32/2, 50/1, 50/2, 50/4, 60/1, 60/2, 80/3, 80/4 and 85/3 and Replace with the attached revised Drawing Nos. 10/3, 20/8, 30/8, 32/2, 50/1, 50/2, 50/4, 60/1, 60/2, 80/3, 80/4 and 85/3.

SECTION 00010A

LINE ITEMS AND PRICING SCHEDULE

FLOOD CONTROL, RIO GRANDE DE ARECIBO, CONTRACT NO. 1
ARECIBO, PUERTO RICO

LINE ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
0001	CLEARING AND GRUBBING		LUMP SUM		$______________
0002	DEMOLITION		LUMP SUM		$______________
0003	CHANNEL EXCAVATION (ESTIMATED QTY.)	239,000	CUBIC METER	$______________	$______________
0004	REGRADE AND FILL RIO SANTIAGO (ESTIMATED QTY.)	3,000	CUBIC METER	$______________	$______________
0005	ARECIBO LEVEE FILL (ESTIMATED QTY.)	124,000	CUBIC METER	$______________	$______________
0006	TANAMA LEVEE FILL (ESTIMATED QTY.)	53,000	CUBIC METER	$______________	$______________
0007	ROADWAY FILL (ESTIMATED QTY.)	10,200	CUBIC METER	$______________	$______________
0008	GEOTEXTILE FILTER FABRIC (ESTIMATED QTY.)	22,000	SQ. METER	$______________	$______________
0009	GABION MATTRESS REVETMENT (ESTIMATED QTY.)	7,200	CUBIC METER	$______________	$______________
0010	CULVERT STRUCTURE NO. 1		LUMP SUM		$______________
0011	PR-10 CULVERT STRUCTURE		LUMP SUM		$______________
0012	SANTIAGO ROADWAY CULVERTS		LUMP SUM		$______________
0013	DEEP SOIL MIXING BY JET GROUTING (ESTIMATED QTY.)		LUMP SUM		$______________
0014	HOT PLANT MIX, BITUMINOUS SURFACE (ESTIMATED QTY.)	9,200	SQ. METER	$______________	$______________
0015	HOT PLANT MIX, BITUMINOUS BASE (ESTIMATED QTY.)	5,600	SQ. METER	$______________	$______________
0016	CRUSHED STONE SUB BASE (ESTIMATED QTY.)	920	CUBIC METER	$______________	$______________
0017	CATTLE CROSSING CONCRETE SURFACE		LUMP SUM		$______________
0018	WATER AND SEWER LINE RELOCATION		LUMP SUM		$______________
0019	TELEPHONE LINE RELOCATION (SEE NOTE 4)		LUMP SUM		$90,000.00
0020	CABLE TELEVISION LINE RELOCATION (SEE NOTE 5)		LUMP SUM		$25,738.00
0021	POWER LINE RELOCATION (SEE NOTE 6)		LUMP SUM		$110,105.00
	TOTAL (LINE ITEMS 0001 THRU 0021)				$______________

SECTION 00010A

LINE ITEMS AND PRICING SCHEDULE

FLOOD CONTROL, RIO GRANDE DE ARECIBO, CONTRACT NO. 1
ARECIBO, PUERTO RICO

LINE ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL

NOTES: **FUNDING AVAILABILITY:**

(1) THE CORPS BELIEVES THIS PROJECT CAN BE EFFICIENTLY CONSTRUCTED WITHIN 18 MONTHS; HOWEVER, OUR CURRENT FUNDING OUTLOOK INDICATES THE FUNDING STREAM WILL BE SPREAD OVER 3 FISCAL YEARS (36 MONTHS) WITH THE PROBABILITY THAT WE WILL RECEIVE NO MORE THAN $1.2M IN FY-05, $3.7M IN FY-06 AND THE BALANCE IN FY-07. BIDDERS SHOULD TAKE THIS INFORMATION AND THE TERMS OF THE CONTINUING CONTRACTS CLAUSE (52.232-5001) INTO CONSIDERATION WHEN PREPARING THEIR BIDS.

(2) BIDDERS MUST BID ON ALL LINE ITEMS. SEE PROVISION AT 52.214-18 (SECTION 00100).

(3) SEE SECTION 00100, "INSTRUCTIONS TO OFFERORS".

(4) PRICE SHOWN IS AN ESTIMATE FURNISHED TO THE GOVERNMENT BY PUERTO RICO TELEPHONE COMPANY (PRTC). CONTRACTOR WILL BE REIMBURSED AT ACTUAL COST. BID ITEM IS REFERENCED IN SECTION 16000 OF THE CONTRACT SPECIFICATIONS AND SHOWN IN DRAWINGS 85/1, 85/3, 85/4 & 85/6.

(5) PRICE SHOWN IS AN ESTIMATE FURNISHED TO THE GOVERNMENT BY LIBERTY CABLEVISION OF PUERTO RICO. CONTRACTOR WILL BE REIMBURSED AT ACTUAL COST. BID ITEM IS REFERENCED IN SECTION 16000 OF THE CONTRACT SPECIFICATIONS AND SHOWN IN DRAWINGS 85/1, 85/3, 85/4 & 85/6.

(6) PRICE SHOWN IS AN ESTIMATE FURNISHED TO THE GOVERNMENT BY PUERTO RICO ELECTRIC POWER AUTHORITY. CONTRACTOR WILL BE REIMBURSED AT ACTUAL COST. BID ITEM IS REFERENCED IN SECTION 16000 OF THE CONTRACT SPECIFICATIONS AND SHOWN IN DRAWINGS 85/1, 85/3, 85/4, 85/5 & 85/6.

(7) FAILURE TO COMPLETE AND RETURN ALL REQUIRED SUBMISSIONS (SF-1442, SECTION 00010, AND SECTION 00101) COULD RENDER YOUR BID NONRESPONSIVE. SEE SECTION 00100, INSTRUCTION TO OFFERORS.

Section 00320

Geotechnical Data Report

for

Rio Grande de Arecibo, Puerto Rico

Prepared by

Geotechnical Branch

Engineering Division

Jacksonville District Corps of Engineers

November 17, 2003

SECTION 00320

GEOTECHNICAL DATA

TABLE OF CONTENTS

SECTION 00320

GEOTECHNICAL DATA

1.1 SCOPE

The information provided in this section encompasses the geotechnical field investigations relevant to this project. The investigations consist of borings with the associated boring logs and laboratory data presented in paragraphs 1.4.5 and 1.4.6, respectively. A character of materials paragraph is included to provide a comprehensive description of the materials utilizing both recent and historical knowledge of the project area. Also included in this section are definitions of terms and boring log notes, which provide additional explanation of the boring logs and drilling techniques. After Contract award, any questions that pertain to the information provided in this section should be addressed to Chief, Geotechnical Branch at (904) 232-1616. Prior to Contract award, refer to Paragraph 999.214-4000 in Section 00100.

Items discussed in the character of materials paragraph may not appear explicitly on the core boring logs. Based on historic knowledge of the project area, the character of materials paragraph includes items that supplement the data documented by the core boring logs. When reviewing core boring logs, use all data on the logs, including the materials description, legend, and blow counts. When evaluating the subsurface conditions, use all data, including the character of materials paragraph and core boring logs.

1.2 CHARACTER OF MATERIALS

1.2.1 Regional Geology

The oil test well 4CPR (Briggs, 1961a) was drilled near the coast southeast of Punta Las Tunas, and penetrated 1,961 m of rock strata. Exposed bedrock in the Arecibo quadrangle and most of the strata penetrated by the deep well are marine sedimentary rocks, chiefly limestone. These sedimentary rocks are generally believed to range from middle Oligocene to middle Miocene in age, although some geologists believe that the sequence contains no Oligocene rocks. This middle Tertiary sequence rests uncomformably on deformed volcanic, and possibly plutonic, rocks of early Tertiary and or Cretaceous age. The bottom 263 m of the test well is mainly composed of pale-olive, olive-gray, and pale yellowish-brown volcanic sandstone and siltstone containing conspicuous pyrite crystals and beds. The volcanic strata in the test well also may be Eocene in age. There is San Sebastian formation directly above the rocks of Eocene age. This strata is chiefly composed of sandstone and conglomarate. These are overlain by about 295 m of rock strata mainly composed of olive-gray calcareous claystone interbedded with subordinate sandstone, clayey limestone, and some coal seams. Also, the formation of Oligocene age mainly consists of gravel, sand, silt, marl, some impure limestone beds, and thin beds of lignite present. Above the San Sebastian formation is Lares formation which is almost entirely composed of coarse-grained to very fine-grained, pinkish-orange, yellowish-gray to light gray pure limestone, calcareous claystone, marl, and sandstone.

1.2.2 Geomorphic Geology

The most prominent single physiographic feature in the proposed site is the valley of the Rio Grande de Arecibo. Almost vertical walls rise as much as 180 m above the flood plain near the south edge of the Arecibo quadrangle where total local relief is about 250 m. The sides of the valley become progressively less steep and lower to the north of the flood plain Irregular benches with moderate karst development occur on the valley sides, representing transitions from adjacent physiographic divisions. The river meanders across a flood plain that is 1.2 km wide at Carreras ward, narrows to 0.6 km at San Pedro, and widens in its lower reaches (Central los Caños to Central Cambalache) to more than 5 km.

The Rio Tanama, which enters the Rio Grande de Arecibo from the southwest has very steep walls, vertical in places with local relief at some points more than 125 m. The river has formed flood plains at some places along its course: the largest plain, about 150 m wide, is about 1.5 km east of La Esparanza.

1.2.3 Local Geology

The local geology within the proposed project is composed of fill and made-land, floodplain alluvium and swamp deposits. The fill and made-land consists of poorly sorted limestone rubble, sand, and clay. The floodplain alluvium is composed of moderately well sorted, gradationally stratified sand, gravel, silt, and clay. Largely composed of quartz, feldspars, and plutonic-rock fragments sand grains, but silicified plutonic-rock and volcanic rock pebbles and cobbles are common; some large blocks of limestone are found near valley margins. The swamp deposits consist of clay, sandy clay, and silty clay, black, gray, and bluish-gray, water saturated, commonly with a high content of organic material.

1.2.4 Materials Encountered

1.2.4.1 Arecibo Levee

The foundation materials encountered within the proposed Arecibo Levee consist of interlayers of clays, silts, and sands. The clay is very soft to hard. Sand encountered includes, silty sand, clayey sand, and clean sand. Silt varies from soft to firm. Roots and organic material were encountered on the surface or few feet below the ground surface. Core boring CB-RA-22 and CB-RA-23 indicate the presence of soft clay and loose sand. Core boring CB-RA-22 shows a soft soil condition at elevation 6.9 ft. to elevation 3.9 ft. and from elevation 2.4 ft. to elevation -0.6 ft. Also CB-RA-23 encountered soft soil condition at –6.7 ft. to elevation –8.2 ft. and from elevation –9.7 ft. to –11.2 ft. Core boring CB-RA-22, CB-RA-23, and CB-RA-24 encountered water levels at ground surface.

1.2.4.2 Rio Santiago Diversion Channel

Within the diversion channel, the material consists of alluvial deposits. The alluvial deposits are composed of interlayers of clays, silts, sands, and gravels. Clay material varies from soft to firm. Sand consists of clayey sand, silty sand and poorly-graded sand. The silt component varies in consistency from soft to firm. Core boring CB-DC-5 encountered soft silt at elevation 10.4 ft. to elevation 5.9 ft. Gravel is composed of limestone fragments with clay of high plasticity. Cobbles, boulders and traces of roots and organic material are expected within the alluvial deposit. Core borings CB-DC-2, CB-DC-4, CB-DC-5, and CB-DC-6 encountered water at or near ground surface. Several core borings show plastic debris, garbage, asphalt debris, and roots near the ground surface. The material within the proposed channel excavation contains thick layers of high plasticity clay. These clay layers will make it difficult to separate suitable materials from unsuitable materials for construction purposes.

1.2.4.3 Tanama Levee

The material encountered within the foundation perimeter of the proposed Tanama Levee consists of interlayers of clay, silt, sand, and gravel with variations in density and consistency. Core boring CB-RT-5 encountered soft organic clay below elevation 11.6 ft. In core boring CB-RT-9 and from elevation 18.2 ft. to elevation –2.8 ft., a clay with soft consistency was encountered. Sand consists of clayey sand, silty sand, and poorly-graded sand.

1.2.4.4 Borrow Area South of PR-22

The material encountered within the proposed borrow area consists of saprolitic limestone which breaks down into sands, silts, gravels, cobbles, and boulders. Core boring CB-BA2-3 encountered layers of hard limestone at different elevations through the entire hole. Test pits, TP-BA2-5 and TP-BA2-6 encountered refusal at approximately 6.0 ft. below the ground surface. The refusal condition encountered during drilling operations and test pit excavation is indicative of saprolitic and hard limestone.

1.3 DEFINITIONS

Terms commonly used in the boring logs shall be defined as:

Banded - Rock from 0.02 to 0.1-foot thick.
Carbonate - Soil component that reacts with HCl of an indeterminate origin (shell, rock, etc.).
Cavity - Voids greater than the diameter of the core.
Decomposed - Saprolite; rock is essentially reduced to a soil with a relic rock texture; can be molded or crumbled by hand.
Dense – Equivalent to SPT N-value of 30 to 50.
Fill - Material that has been placed by man, described with all soil characteristics.
Firm – Thumb will indent soil about ¼ inch (6 mm).
Hard – Soil that can be indented with difficulty by thumbnail or rock that is difficult to scratch with knife (cannot be pitted with a geology hammer but can be chipped with moderate blows of the hammer).
Highly Weathered - Entire rock section is discolored; alteration is greater than 50%; some areas of slightly weathered rock are present; some minerals are leached away; retains only a fraction of its original strength (wet strength usually lower than dry strength).

Incompetent - Rock that disintegrates while coring; weak.
Indurated - Rock or soil hardened or consolidated by pressure or cementation. Very difficult to break by hand.
Layer - Rock or soil with thickness of 6 inches or less.
Laminated - Alternating layers of varying material or color with layers less than 6 mm thick.
Lens – A geologic deposit of variable thickness, which disappears laterally in all directions and cannot be correlated to adjacent borings.
Massive Bedded - Rock over 3-foot thick.
Moderately Hard – Rock that can be scratched easily with a knife; cannot be scratched with fingernail (can be pitted with moderate blows of geology hammer).
Moderately Weathered - Discoloration is evident; rock surface is pitted and altered, with alterations penetrating well below rock surfaces; 10% to 50% of the rock is altered; strength is noticeably less than unweathered rock.
Pitted - Rock with voids 0.03 (1 mm) to 0.02-foot (6 mm) diameter.
Poorly-Indurated - See semi-indurated.
Rock – A naturally occurring substance composed of one or more minerals bound together. This geologic term includes a range of engineering properties: strength, hardness, permeability, weathering, and discontinuity. These properties are noted or can be inferred from the boring logs as blow counts, penetration rate, RQD, hardness, etc.
Seam - Rock or soil with average thickness of 2 to 3 inches.
Semi-Indurated - Rock or soil with a lesser degree of hardening or consolidation by pressure or cementation. Crumbles with little effort by hand.
Shell - Material composed of predominantly (>75%) coarse-grained sand to gravel-sized whole or broken shell.
Slightly Weathered - Rock with superficial discoloration, alteration and/or discoloration along discontinuities; less than 10 % of the rock volume is altered; strength is essentially unaffected.
Soft – Thumb will penetrate soil about 1 inch (25 mm).
Thick Bedded - Rock from 1 to 3-foot thick.
Thin Bedded - Rock from 0.1 to 0.3-foot thick.
Unweathered - Rock with no evidence of any mechanical or chemical alteration.
Very Hard – Rock that cannot be scratched with a knife (chips can be broken off only with heavy blows of the geology hammer).
Vuggy - Rock with voids 0.02 foot (6 mm) to the diameter of the core.

1.4 GEOTECHNICAL DATA

1.4.1 Summary of Borings

The coordinates presented in the table below correspond to the project coordinate system and datum utilized throughout these plans and specifications, which may or may not correspond to the original coordinate system and datum indicated on the boring logs.

Boring Designation	State Plane, PR/VI, NAD27 meters		MSL meters	Project Location
	X	Y	Z	
CB-RA-22	122225	68484	5.30	Arecibo Levee South of PR-22
CB-RA-23	122021	68580	3.90	
CB-RA-24	121924	68706	3.59	
CB-RA-25	121615	68749	5.63	
CB-RA-26	122530	68572	3.83	
CB-RGA-2	122352	68308	16.7	
CB-RGA-3	122735	68516	9.3	
CB-RGA-18	122454	68463	15.75	
CB-DC-1	121718	68371	2.69	Rio Santiago Diversion Channel
CB-DC-2	122135	68140	4.82	
CB-DC-3	122690	68297	5.54	
CB-DC-4	122889	68365	4.18	
CB-DC-5	123091	68760	4.53	
CB-DC-6	123219	69009	2.68	
CB-DC-7	123341	69256	3.07	
CB-DC-8	123423	69420	2.73	
CB-DC-9	123006	64714	5.51	
CB-DC-10	122988	68549	3.87	
CB-DC-11	121844	68084	4.58	
CB-DC-12	122361	68187	5.7	
CB-DC04-12A	122395	68199	5.1	
CB-DC-13	122456	68214	5.12	
CB-DC-14	122802	68173	6.68	
CB-DC-15	123152	68211	5.39	
CB-DC-16	123204	68605	2.99	
CB-DC-17	123426	69058	3.2	
CB-RGA-1	121860	67977	17.1	
CB-RS-8	121515	68863	4.86	
CB-RT-1	123006	64714	11.59	Tanama Levee
CB-RT-3	131303	64905	12.26	
CB-RT-4	123120	65036	11.82	

Boring Designation	State Plane, PR/VI, NAD27 meters		MSL meters	Project Location
	X	Y	Z	
CB-RT-5	123169	65178	10.39	Tanama Levee
CB-RT-6	123221	65326	10.75	
CB-RT-7	123271	65470	10.45	
CB-RT-8	123321	65614	10.4	
CB-RT-9	123372	65758	7.83	
CB-BA2-1	121030	68672	50.3	Borrow Area South of PR-22
CB-BA2-2	121352	68731	48.5	
CB-BA2-3	121065	68380	61.0	
CPT Borings				
CP-DC04-1	122363	68185	5.1	Rio Santiago Diversion Channel
CP-DC04-2	122451	68202	5.6	
CP-DC04-3	122414	68210	9.8	
Test Pits				
TP-DC-1	122614	68229	6.16	Rio Santiago Diversion Channel
TP-DC-2	122976	68159	4.69	
TP-DC-3	123164	68448	5.15	
TP-DC-4	123291	68770	3.84	
TP-DC-5	123465	69266	3.11	
TP-BA2-1	121010	68666	50.5	Borrow Area South of PR-22
TP-BA2-2	121360	68732	48.6	
TP-BA2-3	121063	68381	60.8	
TP-BA2-4	121016	68571	49.7	
TP-BA2-5	121150	68538	20.7	
TP-BA2-6	121146	68655	52.5	
TP-BA2-7	121252	68721	51.7	

1.4.2 Summary of Laboratory Data

Boring Designation	Sample Designation	USCS	LL	PL	w_n	G_S
CB-RA-25	3	MH	76	40	43	
	8	MH	72	36	60	
	11	SC	50	27	23	
CB-RGA-2	8	MH	55	30	34.1	
	14	SM				
	17	CH	62	30	40.7	
	20	SC				
CB-RGA-3	3	MH	61	31	32.5	
	10	MH	54	31	32.6	
	23	MH	62	32	51.7	

Boring Designation	Sample Designation	USCS	LL	PL	w_n	G_S
CB-RGA-18	3	CH	59.40	25.90	31	
CB-DC-1	3	MH	80	40	49	2.55
CB-DC-2	6	MH	55	32	36	
	10	ML	44	27	29	
CB-DC-3	3	MH	52	31	35	
	10	MH	56	32	35	
CB-DC-4	6	CL	44	24	36	
CB-DC-5	5	ML	35	25	30	2.60
	8	SP			25	
CB-DC-7	3	CH	66	26	47	2.56
	8	SP			23	
CB-DC-8	3	ML	41	27	34	
CB-DC-9	6	MH	60	34	46	2.548
	13	CL	42	23	45	2.52
	17	ML	37	26	39	
	19	CL	35	23	35	2.57
CB-DC-10	5	SP-SM			12	2.60
	9	SM			17	
CB-DC-11	4	CH	54	27	44	
	9	SM			49	
CB-DC-12	4				32	
	10	MH	52	31	38	
	12				38	
	17	ML	48	31	42	
	22	MH	50	29	45	
	27	ML	42	26	35	
	32				49	
	36				54	
CB-DC-13	3				36	
	8	ML	45	29	37	
	14	SM	0	0	49	
	20				46	
	23	ML	38	25	35	
	26				28	
	28	CL	40	23	36	
	31	SC	29	16	15	
CB-DC-14	3	CH	54	27	25	
	7	SM	30	23	21	
	9				37	
	11	MH	51	29	43	
CB-DC-15	3	ML	42	29	19	
	7	SP	0	0	30	

Boring Designation	Sample Designation	USCS	LL	PL	w_n	G_S
CB-DC-15	11	SP-SM	0	0	14	
CB-DC-16	2				36	
	5	ML	42	33	46	
	8	SM	0	0	15	
	11				40	
	13				52	
CB-DC-17	4	SP-SM	0	0	4	
	8	SP	0	0	10	
	11	SP	0	0	10	
	14				38	
CB-RGA-1	5	CH	89	31	43.2	
	11	CL				
	13	SP-SM				
	18	CH	96	29	14.6	
CB-RS-8	6	MH	75	39	44	
CB-RT-1	3	MH	55	32	26	2.52
CB-RT-3	5	CL	44	25	33	2.68
CB-RT-4	5	SP-SM			3	
	10	GW			13	
	18	CL	48	27	51	
CB-RT-5	4	CL	46	26	44	2.55
	6	CH	52	27	25	
	8	SC	29	20	41	2.66
CB-RT-6	4	CL	50	27	39	
	10	CH	51	24	45	
CB-RT-8	3	MH	64	37	39	
	11	CH	52	28	51	
CB-RT-9	3	CL	45	25	38	2.52
	6	CL	41	18	37	2.54
	10	CH	52	28	63	2.58
	17	CL	45	26	41	
TP-DC-1		MH	58	32	31	
TP-DC-2		ML	46	18	27	
TP-DC-3		GP-GM	0	0	23	
TP-DC-4		ML	46	33	28	
TP-DC-5		MH	53	33	32	
TP-BA2-1		GP-GM			6	
TP-BA2-2		GM			3	
TP-BA2-3		GM			12	
TP-BA2-4		GM			9	
TP-BA2-5		GC	46	19	14	
TP-BA2-6		GC	35	21	9	

Boring Designation	Sample Designation	USCS	LL	PL	w_n	G_S
TP-BA2-7		SM			8	

1.4.3 Boring Log Notes

All borings, except test pits, were driven using the Standard Penetration Test (SPT) procedure with a 140 lb. hammer with a 30-inch drop using a 2.0-foot split spoon (1 3/8-inch I.D. and 2-inch O.D.) until refusal was encountered. Refusal is defined as a total of 50 blows of the hammer within any 6-inch increment, a total of 100 blows of the hammer within any 1-foot increment, or no observed advance of the sampler after 10 successive blows of the hammer. When refusal was encountered, the borings were continued with a core barrel until the rate of penetration indicated softer material, at which point the SPT procedure was resumed.

1.4.4 Recovered Materials

The materials recovered from the test pits TP-DC-1 through 5 and TP-BA2-1 through 7 are not available.

The materials recovered from the borings are available for inspection by prospective offerors at the Corps of Engineers District Warehouse listed under 2a below:

1. Florida

   a) Jacksonville
      Address: 3077 Talleyrand Avenue
      Jacksonville, FL
      Hours: 07:00 am to 2:30 pm

   b) Clewiston
      Address: 525 Ridgelawn Road
      Clewiston, FL

2. Puerto Rico and the US Virgin Islands

   a) San Juan
      Address: 400 Fernandez Juncos
      Parada 7.5
      Puerta de Tierra, PR

b) Ponce

Address: PR 139, Km 6.1
Ponce, PR

The recovered materials will be available for inspection during normal business hours as noted above, except Federal holidays, during the entire bid period. Prospective offerors shall notify the Jacksonville District Explorations Manager at 904-232-3295; Chief, Geology Section at 904-232-1620; or Chief, Geotechnical Branch at 904-232-1616 at least seven (7) working days before the visit. The following information will be required to schedule the visit: (1) the project title; (2) the specific borings or entire set which are to be viewed; (3) the date, time, and duration of the visit; (4) the name of the person(s) and company to view the borings; and (5) a point of contact and phone number regarding the visit. Offerors shall record their material examination visit in a record book maintained at the inspection site.

It is strongly suggested that all contractors view the samples before submitting their bid.

1.4.5 Boring Logs

Applicable boring logs are presented on the following pages. Boring logs for CB-DC-12 through 17, CB-DC04-12A, CB-BA2-1 through 3, TP-DC-1 through 5, and TP-BA2-1 through 7 are presented in paragraph 1.4.7.

While the Government's borings are representative of subsurface conditions at their respective locations and vertical reaches, local variations characteristic of the rocks and subsurface materials of this region are to be expected. Accordingly, offerors shall form their own conclusions from the examination of the recovered materials prior to submission of their offer.

Hole No.CB-RA-22

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2
1. PROJECT RIO ARECIBO PROJECT		10. SIZE AND TYPE OF BIT See Remarks	
2. LOCATION (Coordinates or Station) X=401,000 Y=224,685		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL	
3. DRILLING AGENCY SUELOS INC.		12. MANUFACTURER'S DESIGNATION OF DRILL CME-45	
4. HOLE NO. (As shown on drawing title and file number) CB-RA-22		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 17 undisturbed: 0	
5. NAME OF DRILLER MIGUEL ALVAREZ		14. TOTAL NUMBER OF CORE BOXES 1	
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED		15. ELEVATION GROUND WATER 17.4 Ft.	
		16. DATE HOLE STARTED 10-03-95 COMPLETED 10-03-95	
7. THICKNESS OF BURDEN 25.5 Ft.		17. ELEVATION TOP OF HOLE 17.39 Ft.	
8. DEPTH DRILLED INTO ROCK 0 Ft.		18. TOTAL CORE RECOVERY FOR BORING 98.0 %	
9. TOTAL DEPTH OF HOLE 25.5 Ft.		19. SIGNATURE OF ENGINEER RAMON TORO	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/.5'
17.4	.0					17.4	
			CLAY, silty, trace sand, dark grayish brown. (CL)	100	1	SPLIT SPOON 15.9	1 2 3
				100	2	" 14.4	4 4 7
				100	3	" 12.9	5 7 9
				100	4	" 11.4	4 4 5
				100	5	" 9.9	4 5 6
			Some sand, dark yellowish brown and brown at 9 feet depth.	100	6	" 8.4	6 7 8
				100	7	" 6.9	7 8 8
5.4	12.0		Sandy, dark yellowish brown at 11 feet depth.	100	8	" 5.4	1 1 1
			SAND, silty, little clay, dark yellowish brown and brown. (SM)	100	9	" 3.9	1 1 1
2.4	15.0			100	10	" 2.4	2 2 2
			CLAY, silty, little sand, yellowish brown. (CL)	100	11	" .9	1 1 1
-.6	18.0			100	12	" -.6	1 1 1
			SAND, silty, little clay, olive brown and dark reddish brown. (SM)	100	13	" -2.1	5 4 3
-3.6	21.0			100	14	" -3.6	4 3 5
-5.1	22.5		SAND, trace silt, olive brown. (SP)	100	15	" -5.1	5 6 7
						(continued)	

Depth scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT	HOLE NUMBER
RIO ARECIBO PROJECT	CB-RA-22

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE 17.39 Ft.

PROJECT: RIO ARECIBO PROJECT

INSTALLATION: Jacksonville District

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/.5'
-5.1	22.5					-5.1	
			SAND, silty, little clayey pockets, dark olive brown. (SM)	100	16	" -6.6	7 8 9
			Little clay pockets at 24 feet depth.	67	17	"	7 9 7
-8.1	25.5					-8.1	
			END OF BORING, 25.5 Ft DEPTH Soils are field visually classified in accordance with the Unified Soil Classification System			Ground water elevation at the time of drilling was 9.8 ft. 140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.)	

Depth scale: 22.5, 25, 27.5, 30, 32.5, 35, 37.5, 40, 42.5, 45, 47.5, 50

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: RIO ARECIBO PROJECT | HOLE NUMBER: CB-RA-22

Hole No.CB-RA-23

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2

1. PROJECT RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT See Remarks
2. LOCATION (Coordinates or Station) X=400,331 Y=225,000	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL CME-45
4. HOLE NO. (As shown on drawing title and file number) CB-RA-23	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 17 undisturbed: 0
5. NAME OF DRILLER MIGUEL ALVAREZ	14. TOTAL NUMBER OF CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER 12.0 Ft.
	16. DATE HOLE STARTED 10-02-95 COMPLETED 10-02-95
7. THICKNESS OF BURDEN 25.5 Ft.	17. ELEVATION TOP OF HOLE 12.8 Ft.
8. DEPTH DRILLED INTO ROCK 0 Ft.	18. TOTAL CORE RECOVERY FOR BORING 98.0 %
9. TOTAL DEPTH OF HOLE 25.5 Ft.	19. SIGNATURE OF GEOLOGIST LUIS MOLINA

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
12.8	.0					12.8	
			CLAY, silty, little sand, trace small roots, dark brown. (CL)	100	1	SPLIT SPOON 11.3	4 3 3
				100	2	" 9.8	5 7 8
				100	3	" 8.3	6 6 7
6.8	6.0			100	4	" 6.8	2 2 2
5.3	7.5		SAND, silty, little clay, fine grained,dark brown mottled, brown. (SM)	100	5	" 5.3	2 2 3
			CLAY, silty, dark brown mottled, few decayed roots, grayish brown. (CL) Little fine sand from 7.5 to 10.5 feet depth.	100	6	" 3.8	2 2 3
				100	7	" 2.3	4 4 5
				100	8	" .8	4 4 4
				100	9	" -.7	4 3 5
			Silty sand lense at 14 feet depth.	100	10	" -2.2	4 3 3
-3.7	16.5			100	11	" -3.7	2 2 2
-5.2	18.0		SILT, sandy, little clay, trace fine gravel, pale yellowish brown. (ML)	100	12	" -5.2	2 3 3
-6.7	19.5		CLAY, silty, few decayed roots, red mottled, yellowish brown. (CL)	100	13	" -6.7	3 3 3
			SILT, organic, little fine sand, gray. (OL) Sandy at 21 feet depth.	100	14	" -8.2	1 1 1
-9.7	22.5			100	15	" -9.7	1 2 1
						(continued)	

Depth scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT RIO ARECIBO PROJECT | HOLE NUMBER CB-RA-23

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE: 12.8 Ft.

PROJECT: RIO ARECIBO PROJECT

INSTALLATION: Jacksonville District

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
-9.7	22.5					-9.7	
			SAND, coarse grained, moderately quatzose, light gray. (SP) High water content at 24 feet depth.	100	16	" -11.2	1, 1, 1
				67	17	" -12.7	1, 2, 2
-12.7	25.5						
			END OF BORING, 25.5 Ft DEPTH SOILS ARE FIELD VISUALLY CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOILS CLASSIFICATION SYSTEM			Ground water elevation at the time of drilling was 8.80 ft. 140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.)	

Depth scale: 22.5, 25, 27.5, 30, 32.5, 35, 37.5, 40, 42.5, 45, 47.5, 50

Hole No.CB-RA-24

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2

1. PROJECT RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT See Remarks
2. LOCATION (Coordinates or Station) X=400,013 Y=225,413	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL CME-45
4. HOLE NO. (As shown on drawing title and file number) CB-RA-24	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 17 undisturbed: 0
5. NAME OF DRILLER MIGUEL ALVAREZ	14. TOTAL NUMBER OF CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER 11.7 ft.
	16. DATE HOLE STARTED 9/28/95 COMPLETED 9/28/95
7. THICKNESS OF BURDEN 25.5 Ft.	17. ELEVATION TOP OF HOLE 11.78 Ft.
8. DEPTH DRILLED INTO ROCK 0 Ft.	18. TOTAL CORE RECOVERY FOR BORING 100 %
9. TOTAL DEPTH OF HOLE 25.5 Ft.	19. SIGNATURE OF GEOLOGIST ARNALDO HERNANDEZ

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
11.8	.0					11.8	
			CLAY, sandy, traces of medium sand, some roots, some organic material, black mottled, dark brown. (CL)	100	1	SPLIT SPOON 10.3	2 3 4
				100	2	" 8.8	5 7 9
7.3	4.5			100	3	" 7.3	3 3 5
			CLAY, some silty clay, some gray clay pockets, moderate to high plasticity, yellowish brown. (CH)	100	4	" 5.8	5 7 8
				100	5	" 4.3	2 1 2
				100	6	" 2.8	3 3 5
1.2	10.6			100	7	" 1.3	3 3 3
			SAND, clayey, fine grained, some gray clays, traces of silty sand, dark yellowish brown. (SC)	100	8	" -.2	2 2 2
				100	9	" -1.7	2 2 2
-3.2	15.0			100	10	" -3.2	2 2 2
			CLAY, silty, some black mottled, some gray clay pockets, yellowish brown. (CL)	100	11	" -4.7	1 1 2
				100	12	" -6.2	1 2 2
				100	13	" -7.7	2 2 2
				100	14	" -9.2	2 3 3
-10.7	22.5			100	15	" -10.7	3 3 3
						(continued)	

Depth scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT	HOLE NUMBER
RIO ARECIBO PROJECT	CB-RA-24

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE 11.78 Ft.

PROJECT: RIO ARECIBO PROJECT

INSTALLATION: Jacksonville District

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/.5'
-10.7	22.5					-10.7	
-12.2	24.0		SAND, clayey, some silty sand, yellowish-brown. (SC)	100	16	" -12.2	4 4 4
-13.7	25.5		CLAY, black mottled, traces of silty clay, mediun to high plasticity, yellowish brown. (CH)	100	17	" -13.7	3 3 3
			End of Boring, 25.5 Ft. Depth Soils are field visually classified in accordance with the Unified Soils Classification System.			Ground water elevation at the time of drilling was 7.2 ft. 140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.)	

Depth scale: 22.5, 25, 27.5, 30, 32.5, 35, 37.5, 40, 42.5, 45, 47.5, 50

Hole No.CB-RA-25

DRILLING LOG

DIVISION: South Atlantic	INSTALLATION: Jacksonville District — SHEET 1 OF 2
1. PROJECT: RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT: See Remarks
2. LOCATION (Coordinates or Station): X=399,000 Y=225,555	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
3. DRILLING AGENCY: SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL: BK-51
4. HOLE NO. (As shown on drawing title and file number): CB-RA-25	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 17 undisturbed: 0
5. NAME OF DRILLER: WILFREDO ANDINO	14. TOTAL NUMBER OF CORE BOXES: 1
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER: 8.97 ft.
	16. DATE HOLE: STARTED 12-08-95 COMPLETED 12-08-95
7. THICKNESS OF BURDEN: 25.5 Ft.	17. ELEVATION TOP OF HOLE: 18.47 Ft.
8. DEPTH DRILLED INTO ROCK: 0 Ft.	18. TOTAL CORE RECOVERY FOR BORING: 91.5 %
9. TOTAL DEPTH OF HOLE: 25.5 Ft.	19. SIGNATURE OF ENGINEER: IVAN JACKSON

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/.5'	Scale
18.5	.0					18.5		0
			CLAY, silty, stiff, few roots, dark brown (CL)	94	1	SPLIT SPOON SAMPLER 17.0	3 4 3	
				100	2	" 15.5	3 3 4	2.5
			yellowish-brown, gray mottled	100	3	" 14.0	3 2 4	
				100	4	" 12.5	2 2 4	5
				100	5	" 11.0	4 4 7	7.5
				33	6	" 9.5	1 2 2	
				55	7	" 8.0	1 1 2	10
			saturated, soft to medium	100	8	" 6.5	2 2 1	
5.0	13.5			100	9	" 5.0	1 1 2	12.5
			SAND, clayey, brown and gray (SC) well graded, brown	100	10	" 3.5	3 5 9	15
				100	11	" 2.0	3 7 3	
.5	18.0			100	12	" .5	4 4 3	17.5
			CLAY, silty, medium, trace sand, brown (CL) sandy, yellowish-brown	100	13	" -1.0	1 2 3	
-2.5	21.0			100	14	" -2.5	3 6 6	20
			SAND, clayey, saturated, brown (SC)	100	15	" -4.0	4 5 4	22.5
						(continued)		

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE: 18.47 Ft.

SHEET 2 OF 2

PROJECT: RIO ARECIBO PROJECT

INSTALLATION: Jacksonville District

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/.5'
-4.0	22.5					-4.0	
				72	16	"	5 4 9
-5.5	24.0					-5.5	
			CLAY, sandy, stiff, dark yellowish-brown (CL)	100	17	"	4 8 8
-7.0	25.5					-7.0	
			END OF BORING, 25.5 Ft DEPTH Soils are field visually classified in accordance with the Unified Soils Classification System.			140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.) Groundwater elevation at the time of drilling was 8.9 ft.	

LAB CLASSIFICATIONS

Elev. (Ft.)	Class.	SG	Wn	LL	PL	PI
15.5	MH	----	43%	76	40	36
8.0	MH	----	60%	72	36	36
3.5	SC	----	23%	50	27	23

Depth scale: 22.5, 25, 27.5, 30, 32.5, 35, 37.5, 40, 42.5, 45, 47.5, 50

Hole No.CB-RA-26

DRILLING LOG

DIVISION: South Atlantic	INSTALLATION: Jacksonville District — SHEET 1 OF 2
1. PROJECT: RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT: See Remarks
2. LOCATION (Coordinates or Station): X=402,001 Y=224,974	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
3. DRILLING AGENCY: SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL: BK-51
4. HOLE NO. (As shown on drawing title and file number): CB-RA-26	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 17 undisturbed: 0
5. NAME OF DRILLER: WILFREDO ANDINO	14. TOTAL NUMBER OF CORE BOXES: 1
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER: -0.9 Ft.
	16. DATE HOLE: STARTED 12/06/95 COMPLETED 12/06/95
	17. ELEVATION TOP OF HOLE: 12.57 Ft.
7. THICKNESS OF BURDEN: 25.5 Ft.	18. TOTAL CORE RECOVERY FOR BORING: 91.0 %
8. DEPTH DRILLED INTO ROCK: 0 Ft.	19. SIGNATURE OF ENGINEER: RAMON TORO
9. TOTAL DEPTH OF HOLE: 25.5 Ft.	

ELEV.	DEPTH	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/.5'
12.6	0.0				12.6	
11.1	1.5	SILT, clayey, trace sand, occasional roots, dark brown. (MH)	72	1	SPLIT SPOON; 11.1	3, 4, 3
9.6	3.0	CLAY, silty, trace fine sand, dark brown. (CL)	72	2	"; 9.6	5, 6, 6
8.1	4.5	SILT, clayey, trace fine sand, occasional roots, dark brown and yellowish brown. (MH)	100	3	"; 8.1	16, 10, 6
		CLAY, silty, trace fine sand, occasional roots, brown and dark yellowish brown. (CL)	100	4	"; 6.6	4, 4, 3
			78	5	"; 5.1	4, 4, 4
			61	6	"; 3.6	2, 3, 2
		Yellowish brown, brown and light olive brown at 9 feet depth.	61	7	"; 2.1	2, 1, 2
		Little to some sand, slightly oxidized, yellowish brown and black mottled at 11 feet depth.	100	8	"; .6	1, 2, 2
-.9	13.5		100	9	"; -.9	1, 2, 3
-2.4	15.0	SILT, clayey, dark grayish brown. (MH)	100	10	"; -2.4	1, 1, 1
-3.9	16.5	SILT, sandy, little clay, dark gray. (ML)	100	11	"; -3.9	2, 2, 2
		SAND, little silt, medium grained, very dark gray and olive. (SP)	100	12	"; -5.4	4, 1, 11
			100	13	"; -6.9	6, 8, 10
		Coarse grained, trace gravel at 20 feet depth.	100	14	"; -8.4	4, 5, 4
			100	15	"; -9.9	7, 14, 18
					(continued)	

Depth scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

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PROJECT: RIO ARECIBO PROJECT — HOLE NUMBER: CB-RA-26

Hole No.CB-RA-26

DRILLING LOG (Cont. Sheet)	ELEVATION TOP OF HOLE 12.57 Ft.	SHEET 2 OF 2
PROJECT RIO ARECIBO PROJECT	INSTALLATION Jacksonville District	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
-9.9	22.5					-9.9	
			Coarse grained, occasional gravel at 23 feet depth.	100	16	"	3 3 13
						-11.4	
				100	17	"	6 7 10
-12.9	25.5					-12.9	
			END OF BOTING, 25.5 Ft DEPTH Soils are field visually classified in accordance with the Unified Soils Classification System. X, Y, and Z coordinates and ground water elevations updated on September 30, 2003 by CESAJ-EN-G.			Ground water elevation at the time of drilling was -2.5 ft. 140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.)	

22.5 25 27.5 30 32.5 35 37.5 40 42.5 45 47.5 50

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. MAR 71

PROJECT	HOLE NUMBER
RIO ARECIBO PROJECT	CB-RA-26

Hole No. CB-RGA-2

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 1 SHEETS

1. PROJECT: Rio Grande de Arecibo	10. SIZE AND TYPE OF BIT: see remarks
2. LOCATION (Coordinates or Station): x=122,351.8107 y=68,308.1361 meters	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
3. DRILLING AGENCY: Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 314
4. HOLE NO. (As shown on drawing title and file number): CB-RGA-2	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER: Charles Mason	14. TOTAL NUMBER CORE BOXES: 1
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER: +7.7'
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED 8/18/88 COMPLETED 8/19/88
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE: +16.7'
9. TOTAL DEPTH OF HOLE: 30.0'	18. TOTAL CORE RECOVERY FOR BORING: 70%
	19. ~~SIGNATURE OF INSPECTOR~~ GEOLOGIST - Rafael A. Rios

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						Bit or Barrel
+16.7	0.0					+16.7 Blows/0.5 Ft
			Clay - stiff, (from 7.5 to 16.5', moderately stiff to soft), medium to high plasticity, color change at 7.5' from dark brown to yellowish brown (CL)	40	1	Split Spoon 1 2 +15.2 4
				47	2	" 5 6 +13.7 12
				67	3	" 7 9 +12.2 13
				47	4	" 7 8 +10.7 9
				60	5	" 5 5 +9.2 5
				67	6 7	" 2 2 +7.7 3
				87	8	" 4 4 +6.2 6
				67	9	" 4 4 +4.7 7
				100	10	" 1 2 +3.2 5
				67	11	" 2 3 +1.7 5
				60	12	" 2 3 +0.2 5
+0.2	16.5		Sand, fine to medium grained, poorly graded, yellowish brown, wet (SP)	60	13	" 3 5 -1.3 6
				100	14	" 7 12 -2.8 15 11

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT: Rio Grande de Arecibo HOLE NO. CB-RGA-2

CB-RGA-2

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE +16.7' | **Hole No.** CB-RGA-2

PROJECT Rio Grande de Arecibo | INSTALLATION Jacksonville District | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	
-4.3	21.0			100	15	Split Spoon -4.3	8 8
			Clay - soft, silty, sandy, (very fine sand), medium plasticity, dark greenish gray (CL)	27	16	" -5.8	1 1 2
				67	17	" -7.3	3 4 4
				100	18	" -8.8	1 2 2
				100	19	" -10.3	2 3 5
-10.8	27.5						
-11.8	28.5		Sand, very fine grained, silty, dark gray, (SM)	67	20	" -11.8	2 4 5
-13.3	30.0		Clay, soft, sandy, silty, low to medium plasticity, dark greenish gray	67	21	" -13.3	2 5 7

Soils are field visually classified in accordance with the Unified Soils Classification System.

140# hammer with 30" drop used on 2' Split Spoon (1-3/8 ID X 2" OD)

LABORATORY CLASSIFICATION

Sample	LL	PL	PI	Class
8	55	30	25	MH
14	-	-	-	SM
17	62	30	32	CH
20	-	-	-	SC

CB-RGA-3

Hole No. CB-RGA-3

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT: Rio Grande de Arecibo	10. SIZE AND TYPE OF BIT: see remarks
2. LOCATION (Coordinates or Station): x=122,735.1734 y=68,516.2360 meters	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
3. DRILLING AGENCY: Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 314
4. HOLE NO. (As shown on drawing title and file number): CB-RGA-3	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER: Charles Mason	14. TOTAL NUMBER CORE BOXES: 1
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER: +9.3 ft
	16. DATE HOLE: STARTED 8/23/88 COMPLETED 8/23/88
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE: +17.3 ft
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING: 70 %
9. TOTAL DEPTH OF HOLE: 30.0'	19. GEOLOGIST - Rafael A. Rios

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	
						Bit or Barrel	
+17.3	0.0					+17.3	Blows/0.5 Ft
			Clay-stiff, medium plasticity, sandy, contains few rock fragments, dark brown (CL)	67	1	Split Spoon +15.8	1 2 2
				47	2	" +14.3	2 4 5
				60	3	" +12.8	5 5 11
				73	4	" +11.3	5 7 7
+10.0	7.3		From 7.3' to 7.5' clay becomes sandy	67	5 6	" +9.8	3 6 5
+9.8	7.5		Sand, very fine grained, clayey, brown (SC)	93	7 8 9	" +8.3	1 2 3
+8.5	8.8		Clay-stiff to medium stiff, medium to high plasticity, slightly sandy, moist, light brown with greenish gray lines (CL-CH)	60	10	" +6.8	2 5 4
				67	11	" +5.3	4 7 6
				60	12	" +3.8	2 5 6
				60	13	" +2.3	3 3 5
				60	14	" +0.8	2 4 4
				73	15	" -0.7	5 7 9
-1.7	19.0		Sand, very fine to fine grained, poorly graded, light gray (SP)	87	16 17	" -2.2	5 8 9
							2

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT: Rio Grande de Arecibo | HOLE NO. CB-RGA-3

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE: +17.3 ft | **Hole No.** CB-RGA-3

PROJECT: Rio Grande de Arecibo | INSTALLATION: Jacksonville District | SHEET 1 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	
						Bit or Barrel	
-3.7	21.0			80	18 19	-3.7	2 2
			Clay-soft to moderatley stiff, traces of fine sand, medium to high plasticity, dark gray (CH) At 29.0' traces of wood remains and becomes sandy.	67	20	Split Spoon -5.2	1 1 1
				73	21	" -6.7	1 2 2
				80	22	" -8.2	1 2 3
				100	23	" -9.7	2 1 1
				67	24	" -11.2	2 4 4
-12.7	30.0			67	25	" -12.7	4 3 2

Soils are field visually classified in accordance with the Unified Soils Classification System.

140# hammer with 30" drop used on 2' Split Spoon (1-3/8" ID X 2" OD)

LABORATORY CLASSIFICATION

Sample	LL	PL	PI	Class
3	61	31	30	MH
10	54	31	23	MH
23	62	32	30	MH

Hole No. CB-RGA-18

DRILLING LOG	DIVISION: SOUTH ATLANTIC	INSTALLATION: JACKSONVILLE DISTRICT	SHEET 1 OF 2 SHEETS

1. PROJECT	SANTIAGO RIVER AT ARECIBO
2. LOCATION (Coordinates or Station)	X= 401,752.67 Y= 224,614.96 feet
3. DRILLING AGENCY	GEOCONSULT, INC.
4. HOLE NO. (As shown on drawing title and file number)	CB-RGA- 18
5. NAME OF DRILLER	
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	
8. DEPTH DRILLED INTO ROCK	---
9. TOTAL DEPTH OF HOLE	25.5 feet
10. SIZE AND TYPE OF BIT	
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	MSL
12. MANUFACTURER'S DESIGNATION OF DRILL	CME-45
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED: 17 UNDISTURBED:
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUND WATER	0.75
16. DATE HOLE	STARTED: 5-15-90 COMPLETED: 5-15-90
17. ELEVATION TOP OF HOLE	15.75
18. TOTAL CORE RECOVERY FOR BORING	62.9 %
19. SIGNATURE OF INSPECTOR	Kermit Schmidt, P.E.

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
15.75	0.0					
14.25	1.5		CLAY, stiff, dark grayish brown, little sand and silt, occ. thin roots, brown mottled (CH)	50	1	5 / 6 / 6
12.75	3.0		very stiff	56	2	8 / 12 / 11
			dark brown, brown and gray mottled.	56	3	10 / 9 / 10
9.75	6.0			56	4	8 / 7 / 6
			CLAY, stiff, silty, brown, little sand, dark brown and gray mottled, partly sandy (CL)	72	5	7 / 6 / 5
6.75	9.0			16	6	5 / 4 / 4
5.25	10.5		CLAY, medium, little sand and silt, brown and gray, occ. pebbles, very dark brown mottled (CH)	72	7	3 / 2 / 3
3.75	10.5		CLAY, medium to stiff, silty, brown and gray, little sand, very dark brown mottled (CL)	56	8	5 / 4 / 4
2.25	13.5		soft to medium, partly sandy	89	9	2 / 2 / 2
▽				100	10	4 / 3 / 4
-0.75	16.5			89	11	PUSH / 2 / 2
			CLAY, medium, brown and gray, little sand and silt, occ. pebbles, dark brown mottled (CH)	78	12	3 / 3 / 3
-3.75	19.5		soft	39	13	PUSH / 2 / 2
-5.25	21.0		olive gray, partly sandy, slightly organic, occ. yellowigh brown mottled	56	14	2 / 1 / 2

00320-28

DRILLING LOG (Cont Sheet)	ELEVATION TOP OF HOLE 15.75 feet	Hole No. CB-RGA-18
PROJECT SANIAGO RIVER AT ARECIBO	INSTALLATION JACKSONVILLE DISTRICT	SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
-5.75	21.0					
-6.75	22.5		CLAY, stiff, silty, some sand, olive and gray, slightly organic, partly very sandy (CL)	72	15	3/7/3
-8.75	24.0		very soft, very sandy and silty	56	16	1/1/1
-9.75	25.5		soft	56	17	3/1/3
			END 25.5'			

NOTES:

A. Soil classifications above are visual classifications using the Unified Soil Classification System.

B. After the visual classification was performed, Atterberg Limits and Water Contents were obtained from the requested samples and the results and final USCS classifications are shown below. Laboratory classification takes precedence over visual classification.

CB-RGA-18		3	LL=59% W=31% PL=26% PI=33% (CH)

00320-29

DRILLING LOG

DIVISION: South Atlantic	INSTALLATION: Jacksonville District — SHEET 1 OF 1
1. PROJECT: RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT: See Remarks
2. LOCATION (Coordinates or Station): X=399,337 Y=224,314	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
3. DRILLING AGENCY: SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL: CME-45
4. HOLE NO. (As shown on drawing title and file number): CB-DC-1	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 10 undisturbed: 0
5. NAME OF DRILLER: MIGUEL ALVAREZ	14. TOTAL NUMBER OF CORE BOXES: 1
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER: 3.7 Ft
	16. DATE HOLE: STARTED 12/06/95 COMPLETED 12/06/95
7. THICKNESS OF BURDEN: 15.0 Ft.	17. ELEVATION TOP OF HOLE: 8.83 Ft.
8. DEPTH DRILLED INTO ROCK: 0 Ft.	18. TOTAL CORE RECOVERY FOR BORING: 100 %
9. TOTAL DEPTH OF HOLE: 15 Ft.	19. SIGNATURE OF GEOLOGIST: ARNALDO HERNANDEZ

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/.5'
8.8	.0					8.8	
			CLAY, silty, trace sand, brown. (CL) Few plastic pieces and other garbage from 0 to 1 ft	100	1	SPLIT SPOON 7.3	1 2 3
				100	2	" 5.8	2 4 3
			Trace silt, few decayed roots at 3 feet depth.	100	3	" 4.3	2 4 3
				100	4	" 2.8	3 4 4
				100	5	" 1.3	4 4 4
			Little fine sand at 8 feet depth	100	6	" -.2	5 6 8
			Brown and gray mottled from 9 to 13 feet depth	100	7	" -1.7	2 3 4
				100	8	" -3.2	3 3 3
-4.7	13.5			100	9	" -4.7	2 3 2
-6.2	15.0		SILT, sandy, trace clayey, olive brown. (ML)	100	10	" -6.2	3 3 4
			END OF BORING, 15 Ft. DEPTH Soils are field visually classified in accordance with the Unified Soil Classification System			Ground water elevation at the time of drilling was -0.2 ft. 140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.)	

LAB CLASSIFICATIONS

Elev. (Ft.)	Class.	SG	Wn	LL	PL	PI
5.8	MH	2.55	49%	80	40	40

Depth scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

Hole No.CB-DC-2

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 1

1. PROJECT RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT See Remarks
2. LOCATION (Coordinates or Station) X=400,703 Y=223,555	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL CME-45
4. HOLE NO. (As shown on drawing title and file number) CB-DC-2	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 10 undisturbed: 0
5. NAME OF DRILLER MIGUEL ALVAREZ	14. TOTAL NUMBER OF CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER 15.8 ft.
	16. DATE HOLE STARTED 9/28/95 COMPLETED 9/28/95
7. THICKNESS OF BURDEN 0 Ft.	17. ELEVATION TOP OF HOLE 15.81 Ft.
8. DEPTH DRILLED INTO ROCK 0 Ft.	18. TOTAL CORE RECOVERY FOR BORING 100 %
9. TOTAL DEPTH OF HOLE 15 Ft.	19. SIGNATURE OF GEOLOGIST ARNALDO HERNANDEZ

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/.5'
15.8	.0					15.8	
			CLAY, sandy, traces of coarse sand, some roots, some organic material, black mottled, dark brown. (CL)	100	1	SPLIT SPOON 14.3	1, 3, 5
				100	2	" 12.8	4, 4, 5
				100	3	" 11.3	5, 5, 5
				100	4	" 9.8	4, 4, 4
			Silty, some black mottled, traces of fine sand, medium plasticity.	100	5	" 8.3	4, 2, 3
				100	6	" 6.8	5, 4, 4
				100	7	" 5.3	3, 4, 4
3.8	12.0			100	8	" 3.8	2, 2, 2
			SAND, silty, fine grained, some clayey sand, dark yellowish brown. (SM)	100	9	" 2.3	3, 2, 2
.8	15.0			100	10	" .8	2, 2, 3
			End of Boring, 15.0 Ft. Depth Soils are field visually classified in accordance with the Unified Soils Classification System.			Ground water elevation at the time of drilling was 11.3 ft. 140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.)	

Depth scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

LAB CLASSIFICATIONS

Elev. (Ft.)	Class.	SG	Wn	LL	PL	PI
8.3	MH	----	36%	55	32	23
2.3	ML	----	29%	44	27	17

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT	HOLE NUMBER
RIO ARECIBO PROJECT	CB-DC-2

Hole No.CB-DC-3

DRILLING LOG

DIVISION: South Atlantic	INSTALLATION: Jacksonville District — SHEET 1 OF 1
1. PROJECT: RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT: See Remarks
2. LOCATION *(Coordinates or Station)*: X=402,526 Y=224,071	11. DATUM FOR ELEVATION SHOWN *(TBM or MSL)*: MSL
3. DRILLING AGENCY: SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL: CME-45
4. HOLE NO. *(As shown on drawing title and file number)*: CB-DC-3	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 10 undisturbed: 0
5. NAME OF DRILLER: MIGUEL ALVAREZ	14. TOTAL NUMBER OF CORE BOXES: 1
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER: 12.68 ft.
	16. DATE HOLE: STARTED 9/27/95 COMPLETED 9/27/95
7. THICKNESS OF BURDEN: 15.0 Ft.	17. ELEVATION TOP OF HOLE: 18.18 Ft.
8. DEPTH DRILLED INTO ROCK: 0 Ft.	18. TOTAL CORE RECOVERY FOR BORING: 100 %
9. TOTAL DEPTH OF HOLE: 15 Ft.	19. SIGNATURE OF GEOLOGIST: ARNALDO HERNANDEZ

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
18.2	.0					18.2	
			CLAY, sandy, some organic material, some roots, black mottled, low plasticity, dark brown. (CL)	100	1	SPLIT SPOON 16.7	2, 3, 4
				100	2	" 15.2	4, 5, 5
				100	3	" 13.7	5, 6, 3
				100	4	" 12.2	4, 4, 4
				100	5	" 10.7	7, 7, 8
9.2	9.0			100	6	" 9.2	10, 3, 6
			SAND, silty, fine grained, traces of medium grained clayey sand, dark yellowish brown. (SM)	100	7	" 7.7	6, 8, 2
6.2	12.0			100	8	" 6.2	3, 3, 2
			CLAY, silty, gray pockets, mediun plasticity, yellowish brown. (CL)	100	9	" 4.7	5, 6, 6
3.2	15.0			100	10	" 3.2	8, 4, 5
			End of Boring, 15.0 Ft. Depth Soils are field visually classified in accordance with the Unified Soils Classification System.			Ground water elevation at the time of drilling was 11.2 ft. 140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.)	

Depth scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

LAB CLASSIFICATIONS

Elev. (Ft.)	Class.	SG	Wn	LL	PL	PI
15.2	MH	----	35%	52	31	21
4.7	MH	----	35%	56	32	24

Hole No.CB-DC-4

DRILLING LOG | DIVISION South Atlantic | INSTALLATION Jacksonville District | SHEET 1 OF 1

1. PROJECT RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT See Remarks
2. LOCATION (Coordinates or Station) X=403,177 Y=224,295	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL CME-45
4. HOLE NO. (As shown on drawing title and file number) CB-DC-4	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 10 undisturbed: 0
5. NAME OF DRILLER MIGUEL ALVAREZ	14. TOTAL NUMBER OF CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER 11.71 ft.
	16. DATE HOLE STARTED 9/28/95 COMPLETED 9/28/95
7. THICKNESS OF BURDEN 0 Ft.	17. ELEVATION TOP OF HOLE 13.71 Ft.
8. DEPTH DRILLED INTO ROCK 0 Ft.	18. TOTAL CORE RECOVERY FOR BORING 100 %
9. TOTAL DEPTH OF HOLE 15 Ft.	19. SIGNATURE OF GEOLOGIST ARNALDO HERNANDEZ

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/.5'
13.7	.0					13.7	
			CLAY, sandy, traces of fine gravel, some roots, traces of fine sand, yellowish brown. (CL)	100	1	SPLIT SPOON 12.2	1 3 5
				100	2	" 10.7	4 4 4
			Silty, some black mottled, some gray clay pockets, moderate plasticity from elevation 10.7 to 3.2 feet depth.	100	3	" 9.2	5 4 4
				100	4	" 7.7	2 2 2
				100	5	" 6.2	4 5 6
				100	6	" 4.7	2 2 3
				100	7	" 3.2	4 3 4
1.7	12.0		Trace sand at elevation 3.2 feet depth.	100	8	" 1.7	3 3 4
.2	13.5		SAND, silty, fine grained, some clayey sand, dark yellowish brown. (SM)	100	9	" .2	3 3 3
-1.3	15.0		CLAY, silty, traces of fine sand, yellowish brown. (CL)	100	10	" -1.3	4 5 7
			End of Boring, 15.0 Ft. Depth Soils are field visually classified in accordance with the Unified Soils Classification System.			Ground water elevation at the time of drilling was 7.7 ft. 140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.) LAB CLASSIFICATIONS	

Elev. (Ft.)	Class.	SG	Wn	LL	PL	PI
6.2	CL	----	36%	44	24	20

Depth scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT RIO ARECIBO PROJECT | HOLE NUMBER CB-DC-4

Hole No.CB-DC-5

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 1

1. PROJECT RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT See Remarks
2. LOCATION *(Coordinates or Station)* X=403,842 Y=225,591	11. DATUM FOR ELEVATION SHOWN *(TBM or MSL)* MSL
3. DRILLING AGENCY SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL CME-45
4. HOLE NO. *(As shown on drawing title and file number)* CB-DC-5	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 10 undisturbed: 0
5. NAME OF DRILLER MIGUEL ALVAREZ	14. TOTAL NUMBER OF CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER 11.3 ft.
	16. DATE HOLE STARTED 11/15/95 COMPLETED 11/15/95
7. THICKNESS OF BURDEN 0 Ft.	17. ELEVATION TOP OF HOLE 14.86 Ft.
8. DEPTH DRILLED INTO ROCK 0 Ft.	18. TOTAL CORE RECOVERY FOR BORING 82 %
9. TOTAL DEPTH OF HOLE 15 Ft.	19. SIGNATURE OF GEOLOGIST ARNALDO HERNANDEZ

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
14.9	.0					14.9	
			CLAY, silty, light brown and brown. (CL)	100	1	SPLIT SPOON 13.4	4, 4, 5
				100	2	" 11.9	3, 4, 4
10.4	4.5		Little fine sand at 3 feet depth.	100	3	" 10.4	2, 3, 2
			SILT, sandy, little clay, yellowish brown. (ML) Trace mica at 5 feet depth.	50	4	" 8.9	1, 1, 1
				55	5	" 7.4	1, 1, 1
5.9	9.0			44	6	" 5.9	1, WH, 1
			SAND, little silt, medium to coarse grained, moderately quartzose, wet, pale brown (SP) Coarse grained with occasional subangular gravel at 9 feet depth.	100	7	" 4.4	2, 3, 4
				100	8	" 2.9	3, 4, 4
				77	9	" 1.4	5, 10, 9
-.1	15.0			88	10	" -.1	7, 7, 11
			End of Boring, 15 Ft. Depth Soils are field visually classified in accordance with the Unified Soils Classification System.			Ground water elevation at the time of drilling was 8.8 ft. 140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.)	

LAB CLASSIFICATIONS

Elev. (Ft.)	Class.	SG	Wn	LL	PL	PI
8.9	ML	2.60	30%	35	25	10
4.4	SP	----	25%	--	--	--

Depth scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT	HOLE NUMBER
RIO ARECIBO PROJECT	CB-DC-5

Hole No.CB-DC-6

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 1

1. PROJECT RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT See Remarks
2. LOCATION (Coordinates or Station) X=404,260 Y=226,407	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL CME-45
4. HOLE NO. (As shown on drawing title and file number) CB-DC-6	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 10 undisturbed: 0
5. NAME OF DRILLER MIGUEL ALVAREZ	14. TOTAL NUMBER OF CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER 5.46 ft.
	16. DATE HOLE STARTED 11-15-95 COMPLETED 11-15-95
7. THICKNESS OF BURDEN 15.0 Ft.	17. ELEVATION TOP OF HOLE 8.79 Ft.
8. DEPTH DRILLED INTO ROCK 0 Ft.	18. TOTAL CORE RECOVERY FOR BORING 81.1 %
9. TOTAL DEPTH OF HOLE 15 Ft.	19. SIGNATURE OF ENGINEER IVAN JACKSON

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/.5'
8.8	.0					8.8	
			SILT, clayey, stiff, trace sand, brown (MH)	100	1	SPLIT SPOON SAMPLER 7.3	2 3 4
5.8	3.0			100	2	" 5.8	2 2 3
			CLAY, silty, gray, red mottled, stiff (CL) dark brown	100	3	" 4.3	3 3 3
2.8	6.0			72	4	" 2.8	4 5 5
			SAND, coarse, some gravel, rounded, brown (SP)	55	5	" 1.3	7 9 6
				89	6	" -.2	7 6 8
				72	7	" -1.7	7 8 7
				55	8	" -3.2	5 6 6
			gray	72	9	" -4.7	7 9 6
-6.2	15.0			89	10	" -6.2	7 10 8
			END OF BORING, 15 Ft. DEPTH Soils are field visually classified in accordance with the Unified Soils Classification System.			140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.) Groundwater elevation at the time of drilling was 4.4 ft.	

Depth scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT RIO ARECIBO PROJECT | HOLE NUMBER CB-DC-6

Hole No.CB-DC-7

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 1

1. PROJECT RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT See Remarks
2. LOCATION *(Coordinates or Station)* X=404,661 Y=227,218	11. DATUM FOR ELEVATION SHOWN *(TBM or MSL)* MSL
3. DRILLING AGENCY SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL CME-45
4. HOLE NO. *(As shown on drawing title and file number)* CB-DC-7	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 10 undisturbed: 0
5. NAME OF DRILLER M. ALVAREZ	14. TOTAL NUMBER OF CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER 4.73 ft.
	16. DATE HOLE STARTED 11-15-95 COMPLETED 11-15-95
7. THICKNESS OF BURDEN 15.0 Ft.	17. ELEVATION TOP OF HOLE 10.07 Ft.
8. DEPTH DRILLED INTO ROCK 0 Ft.	18. TOTAL CORE RECOVERY FOR BORING 100 %
9. TOTAL DEPTH OF HOLE 15 Ft.	19. SIGNATURE OF ENGINEER IVAN JACKSON

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
10.1	.0					10.1	
			CLAY, silty, stiff, few roots, dark brown (CL) brown	100	1	Split Spoon Sampler 8.6	2 3 4
				100	2	" 7.1	2 3 4
			soft, dark brown, mottled	100	3	" 5.6	3 4 5
				100	4	" 4.1	1 1 1
2.6	7.5		soft, slightly organic, bluish gray	100	5	" 2.6	1 2 4
			SAND, medium grained, wet, brown (SP) brown, coarse	100	6	" 1.1	3 4 4
				100	7	" -.4	4 5 5
				100	8	" -1.9	3 4 5
				100	9	" -3.4	4 5 6
-4.9	15.0			100	10	" -4.9	5 4 6
			END OF BORING, 15 Ft. DEPTH Soils are field visually classified in accordance with the Unified Soils Classification System.			140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.) Groundwater elevation at the time of drilling was 4 ft.	

LAB CLASSIFICATIONS

Elev. (Ft.)	Class.	SG	Wn	LL	PL	PI
7.1	CH	2.56	47%	66	26	40
-0.4	SP	----	23%	--	--	--

Depth scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT	HOLE NUMBER
RIO ARECIBO PROJECT	CB-DC-7

Hole No.CB-DC-8

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 1

1. PROJECT RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT See Remarks
2. LOCATION *(Coordinates or Station)* X=404,930 Y=227,756	11. DATUM FOR ELEVATION SHOWN *(TBM or MSL)* MSL
3. DRILLING AGENCY SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL CME-45
4. HOLE NO. *(As shown on drawing title and file number)* CB-DC-8	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 10 undisturbed: 0
5. NAME OF DRILLER Miguel ALVAREZ	14. TOTAL NUMBER OF CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER 3.86 ft.
	16. DATE HOLE STARTED 11-14-95 COMPLETED 11-14-95
7. THICKNESS OF BURDEN 15.0 Ft.	17. ELEVATION TOP OF HOLE 8.96 Ft.
8. DEPTH DRILLED INTO ROCK 0 Ft.	18. TOTAL CORE RECOVERY FOR BORING 100 %
9. TOTAL DEPTH OF HOLE 15 Ft.	19. SIGNATURE OF GEOLOGIST LUIS MOLINA

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
9.0	.0					9.0	
			CLAY, sandy, little silt, trace roots, brown. (CL)	100	1	SPLIT SPOON 7.5	2 2 3
				100	2	" 6.0	2 3 4
				100	3	" 4.5	3 4 4
			Silty with few decayed roots from 4 to 10 feet depth.	100	4	" 3.0	4 5 6
				100	5	" 1.5	1 1 2
			Brown mottled from 8 to 10 feet depth.	100	6	" .0	2 3 4
-1.5	10.5			100	7	" -1.5	2 2 3
			SAND, coarse grained, light gray. (SP)	100	8	" -3.0	3 4 5
				100	9	" -4.5	4 4 6
-6.0	15.0			100	10	" -6.0	4 4 5
			END OF BORING, 15 Ft. DEPTH Soils are field visually classified in accordance with the Unified Classification System.			140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.) Ground water elevation at the time of drilling was -2.1 ft. LAB CLASSIFICATIONS Elev. (Ft.) Class. SG Wn LL PL PI 6.0 ML ---- 34% 41 27 14	

Depth scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT	HOLE NUMBER
RIO ARECIBO PROJECT	CB-DC-8

Hole No.CB-DC-9

DRILLING LOG

- DIVISION: South Atlantic
- INSTALLATION: Jacksonville District
- SHEET 1 OF 2
- 1. PROJECT: RIO ARECIBO PROJECT
- 2. LOCATION (Coordinates or Station): X=401,700 Y=223,843
- 3. DRILLING AGENCY: SUELOS INC.
- 4. HOLE NO. (As shown on drawing title and file number): CB-DC-9
- 5. NAME OF DRILLER: WILFREDO ANDINO
- 6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
- 7. THICKNESS OF BURDEN: 30.0 Ft.
- 8. DEPTH DRILLED INTO ROCK: 0 Ft.
- 9. TOTAL DEPTH OF HOLE: 30.0 Ft.
- 10. SIZE AND TYPE OF BIT: See Remarks
- 11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
- 12. MANUFACTURER'S DESIGNATION OF DRILL: BK-51
- 13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 20 undisturbed: 0
- 14. TOTAL NUMBER OF CORE BOXES: 1
- 15. ELEVATION GROUND WATER: 12.1 Ft.
- 16. DATE HOLE: STARTED 12-11-95 COMPLETED 12-11-95
- 17. ELEVATION TOP OF HOLE: 18.08 Ft.
- 18. TOTAL CORE RECOVERY FOR BORING: 91.0 %
- 19. SIGNATURE OF GEOLOGIST: LUIS MOLINA

ELEV.	DEPTH	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/.5'
18.1	0.0				18.1	
17.6	.5	ASPHALT				
16.6	1.5	SAND, clayey, with gravel size angular rock fragments, trace asphalt, yellowish brown. (SC)	66.5	1	SPLIT SPOON 16.6	4, 8
		CLAY, silty, trace fine sand, dark brown. (CL)	100	2	" 15.1	5, 5, 6
			89.0	3	" 13.6	4, 5, 6
			89.0	4	" 12.1	2, 2, 4
		Few decayed roots from 6 to 12 feet depth.	56	5	" 10.6	3, 4, 4
			100	6	" 9.1	1, 2, 2
			100	7	" 7.6	2, 2, 4
			78.0	8	" 6.1	3, 4, 3
			83.0	9	" 4.6	2, 3, 3
3.1	15.0		61.0	10	" 3.1	2, 2, 3
1.6	16.5	SAND, medium grained, yellowish brown. (SP)	100	11	" 1.6	1, 2, 3
		SILT, sandy, yellowish brown. (ML)	100	12	" .1	1, 1, 2
		Some poorly sand pocket at 22 feet depth.	100	13	" -1.4	1, 1, 2
-2.9	21.0		100	14	" -2.9	1, 1, 2
		SILT, organic, olive gray. (OL)	100	15	" -4.4	3, 3, 3
					(continued)	

Scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: RIO ARECIBO PROJECT — HOLE NUMBER: CB-DC-9

Hole No.CB-DC-9

DRILLING LOG (Cont. Sheet) | ELEVATION TOP OF HOLE 18.08 Ft. | SHEET 2 OF 2

PROJECT: RIO ARECIBO PROJECT | INSTALLATION: Jacksonville District

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
-4.4	22.5					-4.4	
				100	16	"	2 1 2
			Little sand wih few thin sand layer from 24 to 27 feet depth.			-5.9	
				100	17	"	2 1 2
						-7.4	
				100	18	"	2 1 1
			Sandy at 27 feet depth.			-8.9	
				100	19	"	WH WH 1
			Few peat inclusions from 29 to 30 feet depth.			-10.4	
-11.9	30.0			100	20	"	WH 1 2
						-11.9	

END OF BORING, 30 Ft. DEPTH

Soils are field visually classified in accordance with the Unified Soils Classification System.

X, Y, and Z coordinates, ground water elevations, and lab classification elevations updated on September 30, 2003 by CESAJ-EN-G.

140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.)

Ground water elevation at the time of drilling was 10.6 ft.

LAB CLASSIFICATIONS

Elev. (Ft.)	Class.	SG	Wn	LL	PL	PI
10.6	MH	2.54	46%	60	34	26
0.1	CL	2.52	45%	42	23	19
-5.9	ML	----	39%	37	26	11
-8.9	CL	2.57	35%	35	23	12

22.5 25 27.5 30 32.5 35 37.5 40 42.5 45 47.5 50

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT RIO ARECIBO PROJECT | HOLE NUMBER CB-DC-9

Hole No.CB-DC-10

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 1

1. PROJECT: RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT: See Remarks
2. LOCATION (Coordinates or Station): X=403,502 Y=224,898	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
3. DRILLING AGENCY: SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL: BK-51
4. HOLE NO. (As shown on drawing title and file number): CB-DC-10	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 10 undisturbed: 0
5. NAME OF DRILLER: WILFREDO ANDINO	14. TOTAL NUMBER OF CORE BOXES: 1
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER: 3.2 Ft.
	16. DATE HOLE: STARTED 12-07-95 COMPLETED 12-07-95
7. THICKNESS OF BURDEN: 15.0 Ft.	17. ELEVATION TOP OF HOLE: 12.70 Ft.
8. DEPTH DRILLED INTO ROCK: 0 Ft.	18. TOTAL CORE RECOVERY FOR BORING: 66.3 %
9. TOTAL DEPTH OF HOLE: 15.0 Ft.	19. SIGNATURE OF GEOLOGIST: LUIS MOLINA

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
12.7	0.0		CLAY, silty, trace sand, brown. (CL)	89	1	12.7 SPLIT SPOON 11.2	2 / 3 / 5
				50	2	" 9.7	4 / 4 / 4
9.2	3.5		Trace fine gravel at 3 feet depth.				
			SAND, little silt, fine to medium grained, yellowish brown. (SP)	100	3	" 8.2	2 / 2 / 1
				67	4	" 6.7	3 / 3 / 5
			Coarse grained and moderately quartzose from 6 to 15 feet depth.	50	5	" 5.2	3 / 4 / 7
				56	6	" 3.7	2 / 3 / 3
				67	7	" 2.2	3 / 5 / 6
				67	8	" .7	3 / 5 / 3
				61	9	" -.8	5 / 6 / 3
-2.3	15.0			56	10	" -2.3	1 / 1 / 1

Depth scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

END OF BORING, 15 Ft. DEPTH

Soils are field visually classified in accordance with the Unified Soils Classification System

X, Y, and Z coordinates, ground water elevations, and lab classification elevations updated on September 30, 2003 by CESAJ-EN-G.

Ground water elevation at the time of drilling was 3.0 ft.

140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.)

LAB CLASSIFICATIONS

Elev. (Ft.)	Class.	SG	Wn	LL	PL	PI
6.7	SP-SM	2.60	12%	--	--	--
0.7	SM	----	17%	--	--	--

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT	HOLE NUMBER
RIO ARECIBO PROJECT	CB-DC-10

Hole No.CB-DC-11

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 1

1. PROJECT RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT See Remarks
2. LOCATION (Coordinates or Station) X=399,749 Y=223,371	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL BK-51
4. HOLE NO. (As shown on drawing title and file number) CB-DC-11	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 10 undisturbed: 0
5. NAME OF DRILLER WILFREDO ANDINO	14. TOTAL NUMBER OF CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER 4.7 Ft
	16. DATE HOLE STARTED 12/06/95 COMPLETED 12/06/95
7. THICKNESS OF BURDEN 15.0 Ft.	17. ELEVATION TOP OF HOLE 15.03 Ft.
8. DEPTH DRILLED INTO ROCK 0 Ft.	18. TOTAL CORE RECOVERY FOR BORING 89.4 %
9. TOTAL DEPTH OF HOLE 15.0 Ft.	19. SIGNATURE OF ENGINEER IVAN JACKSON

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
15.0	0.0					15.0	
			SILT, clayey, stiff, dark brown, few roots (MH)	100	1	SPLIT SPOON SAMPLER	3 5 5
13.5	1.5					13.5	
			CLAY, silty, stiff, dark brown (CL)	100	2	"	4 4 4
						12.0	
				100	3	"	3 2 2
						10.5	
				100	4	"	2 2 4
						9.0	
				50	5	"	4 5 5
			soft, some sand, yellowish brown			7.5	
				78	6	"	3 2 3
						6.0	
				89	7	"	3 1 1
						4.5	
				78	8	"	2 2 3
3.0	12.0					3.0	
			SAND, fine, wet, yellowish brown (SP)	100	9	"	1 2 2
			medium grained			1.5	
				100	10	"	3 3 7
0.0	15.0					0.0	
			END OF BORING, 15 Ft. DEPTH			140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.)	
			Soils are field visually classified in accordance with the Unified Soil Classification System			Groundwater elevation at the time of drilling was 4.6 ft.	
			X, Y, and Z coordinates, ground water elevations, and lab classification elevations updated on September 30, 2003 by CESAJ-EN-G.			LAB CLASSIFICATIONS	

LAB CLASSIFICATIONS

Elev. (Ft.)	Class.	SG	Wn	LL	PL	PI
10.5	CH	----	44%	54	27	27
3.0	SM	----	49%	--	--	--

Depth scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE.
MAR 71

PROJECT	HOLE NUMBER
RIO ARECIBO PROJECT	CB-DC-11

Hole No. CB-RGA-1

DRILLING LOG

DIVISION	South Atlantic
INSTALLATION	Jacksonville District
SHEET	1 OF 2 SHEETS
1. PROJECT	Rio Grande de Arecibo
2. LOCATION (Coordinates or Station)	x=121,859.7184 y=67,977.0888 meters
3. DRILLING AGENCY	Corps of Engineers
4. HOLE NO. (As shown on drawing title and file number)	CB-RGA-1
5. NAME OF DRILLER	Charles Mason
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	
8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE	30.0'
10. SIZE AND TYPE OF BIT	see remarks
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	MSL
12. MANUFACTURER'S DESIGNATION OF DRILL	Failing 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED: / UNDISTURBED:
14. TOTAL NUMBER CORE BOXES	1
15. ELEVATION GROUND WATER	+13.1'
16. DATE HOLE	STARTED 8/17/88 / COMPLETED 8/17/88
17. ELEVATION TOP OF HOLE	+17.1'
18. TOTAL CORE RECOVERY FOR BORING	71%
19. ~~SIGNATURE OF INSPECTOR~~	GEOLOGIST - Rafael A. Rios

ELEVATION (a)	DEPTH (b)	LEGEND (c)	CLASSIFICATION OF MATERIALS (Description) (d)	% CORE RECOVERY (e)	BOX OR SAMPLE NO. (f)	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) (g)	Blows/0.5 Ft
+17.1	0.0					+17.1 Blows/0.5 Ft	
			Clay - stiff, medium plasticity, sandy, few rock fragments, dark brown to yellowish brown (CL)	47	1	Split Spoon +15.6	2, 3, 4
				40	2	" +14.1	3, 4, 4
				40	3	" +12.6	7, 6, 8
				53	4	" +11.1	6, 6, 6
				53	5	" +9.6	6, 8, 8
				80	6	" +8.1	7, 11, 8
				100	7	" +6.6	4, 4, 7
+5.1	12.0			93	8, 9	" +5.1	2, 2, 3
			Sand, clayey, very fine grained, yellowish brown to dark greenish gray (SC)	80	10	" +3.6	2, 2, 2
+2.1	15.0			100	11	" +2.1	2, 3, 8
			Sand, fine to coarse grained, quartz, wet (SP)	100	12	" +0.6	3, 6, 9
				100	13	" -0.9	4, 5, 7
-1.7	18.8			100	14, 15	"	5, 9
-2.4	19.5		Clay, stiff, high plasticity, limestone fragments, yellowish brown (CH)			-2.4	11, 9

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT Rio Grande de Arecibo | HOLE NO. CB-RGA-1

DRILLING LOG (Cont Sheet)	ELEVATION TOP OF HOLE +17.1'	Hole No. CB-RGA-1
PROJECT Rio Grande de Arecibo	INSTALLATION Jacksonville District	SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	
-3.9	21.0		Sand, medium to coarse grained, quartz, yellowish brown (SP)	100	16	Split Spoon -3.9	12 17
			Gravel and clay mixture, gravel composed mainly of limestone rock fragments up to 1", clay of CH type with high plasticity, yellowish brown (GC)	40	17	" -5.4	16 6 6
				40	18	" -6.9	12 8 15
				60	19	" -8.4	25 12 13
				80	20 21	" -9.9	10 64 48
				53	22	" -11.4	20 15 21
-12.9	30.0			60	23	" -12.9	14 22 13

Soils are field visually classified in accordance with the Unified Soils Classification System.

140# Hammer with 30" drop used on 2'Split Spoon (1-3/8" ID X 2" OD)

LABORATORY CLASSIFCATION

Sample	LL	PL	PI	CLASS
5	89	31	58	CH
11	-	-	-	CL
13	-	-	-	SP-SM
18	96	29	67	CH

00320-43

Hole No.CB-RS-8

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 1
1. PROJECT RIO ARECIBO PROJECT		10. SIZE AND TYPE OF BIT See Remarks	
2. LOCATION (Coordinates or Station) X=398,670 Y=225,929		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL	
3. DRILLING AGENCY SUELOS INC.		12. MANUFACTURER'S DESIGNATION OF DRILL BK-51	
4. HOLE NO. (As shown on drawing title and file number) CB-RS-8		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 9 undisturbed: 0	
5. NAME OF DRILLER WIFREDO ANDINO		14. TOTAL NUMBER OF CORE BOXES 1	
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED		15. ELEVATION GROUND WATER 3.0 Ft.	
		16. DATE HOLE STARTED 12-08-95 COMPLETED 12-08-95	
		17. ELEVATION TOP OF HOLE 15.94 Ft.	
7. THICKNESS OF BURDEN 15.0 Ft.		18. TOTAL CORE RECOVERY FOR BORING 79.0 %	
8. DEPTH DRILLED INTO ROCK 0 Ft.		19. SIGNATURE OF ENGINEER RAMON TORO	
9. TOTAL DEPTH OF HOLE 15.0 Ft.			

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/.5'
15.9	0.0					15.9	
14.4	1.5		SILT, clayey, trace sand, occasional roots, occasional rock fragments, dark brown. (MH)	39	1	SPLIT SPOON 14.4	2, 4, 8
12.9	3.0		SILT, little sand, limestone fragments, yellowish brown. (ML)	100	2	" 12.9	24, 46, 41
			CLAY, silty, limestone fragments, dark brown. (CL)	56	3	" 11.4	15, 7, 8
				100	4	" 9.9	4, 5, 5
			Dark yellowish brown at 6 feet depth.	89	5	" 8.4	5, 6, 7
			brown and yellowish brown from 7 to 10 feet depth.	100	6	" 6.9	2, 2, 4
5.4	10.5		Some oxidated thin fractures at 9 feet depth.	100	7	" 5.4	3, 4, 5
3.9	12.0		SILT, clayey, trace fine sand, yellowish gray. (MH)	28	8	" 3.9	3, 3, 4
1.4	14.5		POSIBLE CAVITIE No Recover	0		FROM 12.0 TO 14.5 Ft. RODS WENT FREE AFTER FIRST BLOW. 1.4	
-.1	16.0		SILT, clayey, trace fine sand, olive brown and gray. (MH)	100	9	" -.1	2, 2, 3
			END OF HOLE, 16 Ft. DEPTH Soils are field visually classified in accordance with the Unified Soils Classification System X, Y, and Z coordinates, ground water elevations, and lab classification elevations updated on September 30, 2003 by CESAJ-EN-G.			Ground water elevation at the time of drilling was 1.5 ft. 140# HAMMER WITH 30" DROP USED ON 2.0" SPLIT SPOON (1-3/8 I.D. X 2" O.D.) LAB CLASSIFICATIONS Elev.(Ft.) 8.4, Class. MH, SG ----, Wn 44%, LL 75, PL 39, PI 36	

Scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT	HOLE NUMBER
RIO ARECIBO PROJECT	CB-RS-8

Hole No.CB-RT-1

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2

1. PROJECT RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT See Remarks
2. LOCATION (Coordinates or Station) X=403,563 Y=212,315	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL TRIPOD
4. HOLE NO. (As shown on drawing title and file number) CB-RT-1	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 20 undisturbed: 0
5. NAME OF DRILLER MIGUEL ALVAREZ	14. TOTAL NUMBER OF CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER 17.8 Ft.
	16. DATE HOLE STARTED 10-30-95 COMPLETED 11-01-95
7. THICKNESS OF BURDEN 30 Ft.	17. ELEVATION TOP OF HOLE 38.02 Ft.
8. DEPTH DRILLED INTO ROCK 0 Ft.	18. TOTAL CORE RECOVERY FOR BORING 95.0 %
9. TOTAL DEPTH OF HOLE 30 Ft.	19. SIGNATURE OF GEOLOGIST LUIS MOLINA

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
38.0	.0					38.0	
			SILT, clayey, trace sand, some roots, some organic material, dark brown to brown. (MH)	100	1	SPLIT SPOON 36.5	8 8 14
				100	2	" 35.0	8 11 11
				100	3	" 33.5	10 11 12
				100	4	" 32.0	11 12 14
				100	5	" 30.5	10 13 15
			Sandy at 8 feet depth.	100	6	" 29.0	11 10 13
27.5	10.5			100	7	" 27.5	16 23 22
			CLAY, sandy, yellowish brown. (CL)	100	8	" 26.0	20 22 25
				100	9	" 24.5	11 20 23
23.0	15.0			100	10	" 23.0	16 18 17
			SAND, silty, yellowish brown. (SM)	100	11	" 21.5	15 20 21
20.0	18.0			100	12	" 20.0	16 19 30
			GRAVEL, silty, some sand, yellowish brown. (GW)	72	13	" 18.5	50 60 80/3
				56	14	" 17.0	14 9 4
				83	15	" 15.5	7 8 10
						(continued)	

Depth scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT	HOLE NUMBER
RIO ARECIBO PROJECT	CB-RT-1

Hole No.CB-RT-1

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE: 38.02 Ft.

SHEET 2 OF 2

PROJECT: RIO ARECIBO PROJECT

INSTALLATION: Jacksonville District

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
15.5	22.5					15.5	
				89	16	" 14.0	19, 11, 7
13.0	25.0			100	17	" 12.5	4, 4, 5
			SAND, clayey, medium grained, olive brown. (SC)	100	18	" 11.0	3, 3, 3
				100	19	" 9.5	2, 2, 2
8.0	30.0			100	20	" 8.0	2, 2, 3
			END OF BORING, 30 Ft. DEPTH Soil are field visually classified in accordance with the Unified Soil Classification System			Ground water elevation at the time of drilling was 14.5 ft. 140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. X 2" O.D.) LAB CLASSIFICATIONS Elev. (Ft.) Class. Wn SG LL PL PI 35.0 MH 26% 2.52 55 32 23	

Depth scale: 22.5, 25, 27.5, 30, 32.5, 35, 37.5, 40, 42.5, 45, 47.5, 50

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: RIO ARECIBO PROJECT

HOLE NUMBER: CB-RT-1

Hole No.CB-RT-3

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2
1. PROJECT RIO ARECIBO PROJECT		10. SIZE AND TYPE OF BIT See Remarks	
2. LOCATION (Coordinates or Station) X=403,783 Y=212,943		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL	
3. DRILLING AGENCY SUELOS INC.		12. MANUFACTURER'S DESIGNATION OF DRILL CME-45	
4. HOLE NO. (As shown on drawing title and file number) CB-RT-3		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 20 undisturbed: 0	
5. NAME OF DRILLER MIGUEL ALVAREZ		14. TOTAL NUMBER OF CORE BOXES 1	
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED		15. ELEVATION GROUND WATER 25.2 ft.	
		16. DATE HOLE STARTED 10/16/95 COMPLETED 10/16/95	
7. THICKNESS OF BURDEN 30.0 Ft.		17. ELEVATION TOP OF HOLE 40.22 Ft.	
8. DEPTH DRILLED INTO ROCK 0 Ft.		18. TOTAL CORE RECOVERY FOR BORING 91.6 %	
9. TOTAL DEPTH OF HOLE 30 Ft.		19. SIGNATURE OF GEOLOGIST ARNALDO HERNANDEZ	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
40.2	.0					40.2	
			CLAY, some roots, trace of fine sand, brown-yellowish brown. (CL)	100	1	SPLIT SPOON 38.7	3 3 4
				100	2	" 37.2	3 4 3
				100	3	" 35.7	5 6 7
				100	4	" 34.2	6 8 7
				100	5	" 32.7	4 6 7
				100	6	" 31.2	5 7 8
29.7	10.5			100	7	" 29.7	7 6 7
			SAND, silty, mediun grained, locally coarse, poorly graded, traces of gravel with subrounded to subangular brown clasts, yellowish brown, dark yellowish brown. (SM)	55	8	" 28.2	11 13 10
				50	9	" 26.7	14 17 15
				55	10	" 25.2	17 16 11
				72	11	" 23.7	10 21 10
				100	12	" 22.2	3 5 5
				100	13	" 20.7	4 9 6
				100	14	" 19.2	14 17 22
				100	15	" 17.7	10 17 14
						(continued)	

Depth scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE.
MAR 71

PROJECT	HOLE NUMBER
RIO ARECIBO PROJECT	CB-RT-3

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE: 40.22 Ft.

SHEET 2 OF 2

PROJECT: RIO ARECIBO PROJECT

INSTALLATION: Jacksonville District

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
17.7	22.5					17.7	
16.2	24.0			100	16	" 16.2	8 12 16
			SILT, sandy, black mottled, some organic material, dark gray. (ML)	100	17	" 14.7	3 2 4
				100	18	" 13.2	1 1 2
			Some peat inclusion at elevation 13.2 feet depth.	100	19	" 11.7	1 1 1
10.2	30.0			100	20	" 10.2	2 3 3
			END OF BORING, 30.0 Ft. DEPTH Soils are field visually classified in accordance with the Unified Soils Classification System.			Ground water elevation at the time of drilling was 29.2 ft. 140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.) LAB CLASSIFICATIONS Elev. (Ft.) 34.2, Class. CL, Wn 33%, SG 2.68, LL 44, PL 25, PI 19	

Depth scale: 22.5, 25, 27.5, 30, 32.5, 35, 37.5, 40, 42.5, 45, 47.5, 50

Hole No.CB-RT-4

DRILLING LOG

DIVISION: South Atlantic	INSTALLATION: Jacksonville District — SHEET 1 OF 2
1. PROJECT: RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT: See Remarks
2. LOCATION (Coordinates or Station): X=403,937 Y=213,372	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
3. DRILLING AGENCY: SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL: CME-45
4. HOLE NO. (As shown on drawing title and file number): CB-RT-4	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 20 undisturbed: 0
5. NAME OF DRILLER: MIGUEL ALVAREZ	14. TOTAL NUMBER OF CORE BOXES: 1
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER: 27.78 ft.
	16. DATE HOLE: STARTED 11-02-95 COMPLETED 11-02-95
7. THICKNESS OF BURDEN: 30.0 Ft.	17. ELEVATION TOP OF HOLE: 38.78 Ft.
8. DEPTH DRILLED INTO ROCK: 0.0 Ft.	18. TOTAL CORE RECOVERY FOR BORING: 81 %
9. TOTAL DEPTH OF HOLE: 30.0 Ft.	19. SIGNATURE OF GEOLOGIST: LUIS MOLINA

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/.5'	
38.8	0.0					38.8		
			GRAVEL, sandy, calcareous, angular, brown and white. (GW)	56	1	SPLIT SPOON	19	0
							13	
37.3	1.5					37.3	9	
			SAND, clayey, medium grained, some oxidation, trace fine gravel, brown. (SC)	78	2	"	7	
							6	
						35.8	8	2.5
				100	3	"	4	
							4	
34.3	4.5					34.3	5	
			SAND, and gravel, coarse grained, little silt, moderately quartzose, brown. (SP)	100	4	"	8	5
							7	
						32.8	4	
				56	5	"	4	
							2	
						31.3	4	7.5
				78	6	"	4	
							4	
						29.8	6	
				56	7	"	10	
							10	
28.3	10.5					28.3	10	10
			GRAVEL, sandy, little silt, light water content, grayish brown. (GW)	44	8	"	16	
							10	
						26.8	11	
				50	9	"	4	12.5
							2	
						25.3	9	
				67	10	"	17	
							13	
						23.8	12	15
			Moist from 15 to 18 feet depth.	78	11	"	11	
							2	
						22.3	6	
				72	12	"	5	
							9	17.5
						20.8	7	
			Fine gravel at 18 feet depth.	89	13	"	14	
							12	
19.3	19.5					19.3	16	
			SAND, clayey, little silt, fine grained, slightly organic, olive gray. (SC)	100	14	"	4	20
							3	
17.8	21.0					17.8	3	
			SILT, organic, olive light gray. (OL)	100	15	"	3	
							4	
						16.3	3	22.5
						(continued)		

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT	HOLE NUMBER
RIO ARECIBO PROJECT	CB-RT-4

Hole No.CB-RT-4

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE: 38.78 Ft.

SHEET 2 OF 2

PROJECT: RIO ARECIBO PROJECT

INSTALLATION: Jacksonville District

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
16.3	22.5					16.3	
			Little fine sand from 24 to 30 feet depth.	100	16	" 14.8	2, 2, 2
				100	17	" 13.3	4, 3, 2
				100	18	" 11.8	2, 2, 2
				100	19	" 10.3	WH, 1, 2
8.8	30.0			100	20	" 8.8	2, 3, 3

End of Boring, 30 Ft. DEPTH

Soils are field visually classified in accordance with the Unified Soils Classification System.

X and Y coordinates updated on September 30, 2003 by CESAJ-EN-G.

Ground water elevation at the time of drilling was 28.3 ft.

140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. X) 2" O.D.)

LAB CLASSIFICATIONS

Elev. (Ft.)	Class.	SG	Wn	LL	PL	PI
32.8	SP-SM	----	3%	--	--	--
25.3	GW	----	13%	--	--	--
13.3	CL	----	51%	48	27	21

Depth scale: 22.5, 25, 27.5, 30, 32.5, 35, 37.5, 40, 42.5, 45, 47.5, 50

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: RIO ARECIBO PROJECT | HOLE NUMBER: CB-RT-4

Hole No.CB-RT-5

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2

1. PROJECT RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT See Remarks
2. LOCATION *(Coordinates or Station)* X=404,098 Y=213,839	11. DATUM FOR ELEVATION SHOWN *(TBM or MSL)* MSL
3. DRILLING AGENCY SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL CME 45
4. HOLE NO. *(As shown on drawing title and file number)* CB-RT-5	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 20 undisturbed: 0
5. NAME OF DRILLER MIGUEL ALVAREZ	14. TOTAL NUMBER OF CORE BOXES 0
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER 27.9
	16. DATE HOLE STARTED 11-21-95 COMPLETED 11-22-95
7. THICKNESS OF BURDEN 30.0 Ft.	17. ELEVATION TOP OF HOLE 34.09 Ft.
8. DEPTH DRILLED INTO ROCK 0.0 Ft.	18. TOTAL CORE RECOVERY FOR BORING 95.3 %
9. TOTAL DEPTH OF HOLE 30 Ft.	19. SIGNATURE OF ENGINEER IVAN JACKSON MADURO

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
34.1	.0					34.1	
			CLAY, medium, dark brown (CH). Several decayed roots with organic matter from 0 to 1.5 feet depth.	100	1	Split Spoon Sampler 32.6	1, 2, 3
			(stiff, fewer roots)	100	2	" 31.1	2, 3, 4
				100	3	" 29.6	3, 4, 5
				100	4	" 28.1	2, 2, 1
			(soft)	100	5	" 26.6	1, 2, 2
25.1	9.0			100	6	" 25.1	1, 2, 1
			SAND, clayey, very fine, little organic matter, brown, (SC).	100	7	" 23.6	1, 1, 1
			(silty, some peat)	100	8	" 22.1	1, 1, 1
				100	9	" 20.6	1, 3, 2
19.1	15.0		(coarse sand)	100	10	" 19.1	5, 4, 6
17.6	16.5		CLAY, sandy, soft, wet, brown, (CL).	100	11	" 17.6	10, 14, 13
16.1	18.0		SAND, coarse, trace gravel, brown, (SP).	39	12	" 16.1	12, 13, 19
14.6	19.5		SAND, and gravel, coarse, rounded, wet, (SW).	67	13	" 14.6	7, 10, 13
13.1	21.0		SILT, clayey, soft, yellowish-brown, (MH).	100	14	" 13.1	4, 2, 2
11.6	22.5		SAND, silty, coarse, wet, brown, (SM).	100	15	" 11.6	5, 2, 1
						(continued)	

Depth scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT	HOLE NUMBER
RIO ARECIBO PROJECT	CB-RT-5

Hole No.CB-RT-5

DRILLING LOG (Cont. Sheet)	ELEVATION TOP OF HOLE 34.09 Ft.	SHEET 2 OF 2
PROJECT RIO ARECIBO PROJECT	INSTALLATION Jacksonville District	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
11.6	22.5					11.6	
			CLAY, silty, slightly organic, dark gray, soft, (OH).	100	16	" 10.1	1 1 1
				100	17	" 8.6	1 1 2
				100	18	" 7.1	2 1 2
				100	19	" 5.6	1 1 1
4.1	30.0			100	20	" 4.1	1 2 2
			End of Boring, 30.0 Ft. Depth				
			Soils are field visually classified in accordance with the Unified Soils Classification System.			Ground water elevation at the time of drilling was 24.5 ft. 140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2.0" O.D.)	

LAB CLASSIFICATIONS

Elev. (Ft.)	Class.	SG	Wn	LL	PL	PI
29.6	CL	2.55	44%	46	26	20
26.6	CH	----	25%	52	27	25
23.6	SC	2.66	41%	29	20	9

22.5 25 27.5 30 32.5 35 37.5 40 42.5 45 47.5 50

Hole No.CB-RT-6

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2

1. PROJECT RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT See Remarks
2. LOCATION *(Coordinates or Station)* X=404,268 Y=214,323	11. DATUM FOR ELEVATION SHOWN *(TBM or MSL)* MSL
3. DRILLING AGENCY SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL CME-45
4. HOLE NO. *(As shown on drawing title and file number)* CB-RT-6	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 20 undisturbed: 0
5. NAME OF DRILLER MIGUEL ALVAREZ	14. TOTAL NUMBER OF CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER 27.27 ft.
	16. DATE HOLE STARTED 11-22-95 COMPLETED 11-22-95
7. THICKNESS OF BURDEN 30.0 Ft.	17. ELEVATION TOP OF HOLE 35.27 Ft.
8. DEPTH DRILLED INTO ROCK 0 Ft.	18. TOTAL CORE RECOVERY FOR BORING 100 %
9. TOTAL DEPTH OF HOLE 30 Ft.	19. SIGNATURE OF ENGINEER IVAN JACKSON

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
35.3	.0					*35.3*	
			CLAY, silty, several roots, dark brown (CL)	100	1	SPLIT SPOON SAMPLER *33.8*	1, 3, 4
				100	2	" *32.3*	3, 5, 5
				100	3	" *30.8*	6, 7, 7
				100	4	" *29.3*	3, 3, 4
				100	5	" *27.8*	4, 5, 6
				100	6	" *26.3*	6, 7, 6
			sandy, yellowish-brown	100	7	" *24.8*	6, 7, 7
				100	8	" *23.3*	3, 3, 3
				100	9	" *21.8*	3, 4, 4
				100	10	" *20.3*	3, 4, 5
				100	11	" *18.8*	3, 3, 3
17.3	18.0			100	12	" *17.3*	3, 4, 5
15.8	19.5		SAND, clayey, fine grained, brown (SC)	100	13	" *15.8*	3, 3, 3
14.3	21.0		CLAY, silty, saturated, soft, brown (CL)	100	14	" *14.3*	3, 3, 4
12.8	22.5		SAND, clayey, fine, brown and gray (SC)	100	15	" *12.8*	2, 2, 2
						(continued)	

Depth scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT RIO ARECIBO PROJECT | HOLE NUMBER CB-RT-6

Hole No.CB-RT-6

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE: 35.27 Ft.

SHEET 2 OF 2

PROJECT: RIO ARECIBO PROJECT

INSTALLATION: Jacksonville District

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
12.8	22.5					12.8	
11.3	24.0		CLAY, silty, soft, saturated, yellowish-brown (CL)	100	16	" 11.3	1 2 2
9.8	25.5		SAND, silty, very fine, bluish-gray (SM)	100	17	" 9.8	WH 1 2
			CLAY, silty, medium, dark gray, some peat (CL)	100	18	" 8.3	2 2 2
6.8	28.5			100	19	" 6.8	1 2 2
5.3	30.0		SAND, clayey, dark gray (SC)	100	20	" 5.3	2 3 10

END OF BORING, 30 Ft. DEPTH

Soils are field visually classified in accordance with the Unified Soils Classification System.

140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.)

Groundwater elevation at the time of drilling was 27.2 ft.

LAB CLASSIFICATIONS

Elev. (Ft.)	Class.	SG	Wn	LL	PL	PI
30.8	CL	----	39%	50	27	23
21.8	CH	----	45%	51	24	27

Depth scale: 22.5, 25, 27.5, 30, 32.5, 35, 37.5, 40, 42.5, 45, 47.5, 50

Hole No.CB-RT-7

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2

1. PROJECT RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT See Remarks
2. LOCATION (Coordinates or Station) X=404,430 Y=214,795	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL CME-45
4. HOLE NO. (As shown on drawing title and file number) CB-RT-7	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 20 undisturbed: 0
5. NAME OF DRILLER MIGUEL ALVAREZ	14. TOTAL NUMBER OF CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER 27.6 Ft.
	16. DATE HOLE STARTED 11-27-95 COMPLETED 11-27-95
7. THICKNESS OF BURDEN 30 Ft.	17. ELEVATION TOP OF HOLE 34.28 Ft.
8. DEPTH DRILLED INTO ROCK 0 Ft.	18. TOTAL CORE RECOVERY FOR BORING 100 %
9. TOTAL DEPTH OF HOLE 30 Ft.	19. SIGNATURE OF GEOLOGIST LUIS MOLINA L. Molina

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/.5'
34.3	.0					34.3	
			SILT, little clay, trace roots, brown. (ML) Sandy at 1 foot.	100	1	SPLT SPOON 32.8	2, 2, 3
31.3	3.0			100	2	" 31.3	2, 3, 3
			CLAY, silty, trace fine sand, trace decayed roots, brown. (CL)	100	3	" 29.8	3, 4, 4
				100	4	" 28.3	4, 5, 5
				100	5	" 26.8	3, 5, 6
25.3	9.0		Trace coarse sand at 8 feet depth.	100	6	" 25.3	5, 6, 7
23.8	10.5		SILT, sandy, yellowish brown. (ML)	100	7	" 23.8	6, 6, 6
			CLAY, silty, trace fine sand, trace decayed roots, brown. (CL)	100	8	" 22.3	4, 5, 6
20.8	13.5			100	9	" 20.8	5, 5, 7
19.3	15.0		SAND, silty, fine grained, brown. (SM)	100	10	" 19.3	4, 6, 6
			CLAY, silty, trace decayed roots, brown. (CL)	100	11	" 17.8	2, 2, 2
				100	12	" 16.3	2, 2, 3
14.8	19.5			100	13	" 14.8	2, 2, 2
13.3	21.0		SAND, silty, fine grained, light brown. (SM)	100	14	" 13.3	2, 2, 2
			SILT, clayey, moderately orgainc, olive gray. (MH)	100	15	" 11.8	2, 2, 2
						(continued)	

Scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT RIO ARECIBO PROJECT | HOLE NUMBER CB-RT-7

Hole No.CB-RT-7

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE: 34.28 Ft.

SHEET 2 OF 2

PROJECT: RIO ARECIBO PROJECT

INSTALLATION: Jacksonville District

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
11.8	22.5					11.8	
10.3	24.0			100	16	" 10.3	1, 2, 2
			SAND, silty, fine grained, slightly organic, olive gray. (SM)	100	17	" 8.8	2, 2, 2
7.3	27.0			100	18	" 7.3	1, 2, 2
			SILT, organic, dark olive gray. (OL)	100	19	" 5.8	2, 2, 2
4.3	30.0			100	20	" 4.3	2, 2, 3
			END OF BORING, 30 Ft. DEPTH Soils are field visually classified in accordance with the Unified Soils Classification System.			140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.) Ground water elevation at the time of drilling was 25.3 ft.	

Depth scale: 22.5, 25, 27.5, 30, 32.5, 35, 37.5, 40, 42.5, 45, 47.5, 50

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: RIO ARECIBO PROJECT | HOLE NUMBER: CB-RT-7

DRILLING LOG

DIVISION South Atlantic	INSTALLATION Jacksonville District — SHEET 1 OF 2
1. PROJECT RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT See Remarks
2. LOCATION *(Coordinates or Station)* X=404,597 Y=215,268	11. DATUM FOR ELEVATION SHOWN *(TBM or MSL)* MSL
3. DRILLING AGENCY SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL CME-45
4. HOLE NO. *(As shown on drawing title and file number)* CB-RT-8	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 20 undisturbed: 0
5. NAME OF DRILLER MIGUEL ALVAREZ	14. TOTAL NUMBER OF CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER 28.0 ft.
	16. DATE HOLE STARTED 9/26/95 COMPLETED 9/27/95
7. THICKNESS OF BURDEN 30.0 Ft.	17. ELEVATION TOP OF HOLE 34.12 Ft.
8. DEPTH DRILLED INTO ROCK 0 Ft.	18. TOTAL CORE RECOVERY FOR BORING 100 %
9. TOTAL DEPTH OF HOLE 30 Ft.	19. SIGNATURE OF GEOLOGIST ARNALDO HERNANDEZ

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
34.1	.0					34.1	
			CLAY, black mottled some roots, traces of fine sand, brown-dark brown. (CH)	100	1	SPLIT SPOON 32.6	2 4 3
				100	2	" 31.1	4 4 4
				100	3	" 29.6	6 6 3
				100	4	" 28.1	4 6 7
26.6	7.5			100	5	" 26.6	9 9 10
			Black mottled with mediun to high plasticity at elevation 26.6 feet depth.	100	6	" 25.1	8 3 4
				100	7	" 23.6	6 7 2
				100	8	" 22.1	3 4 4
				100	9	" 20.6	4 6 6
				100	10	" 19.1	5 2 3
				100	11	" 17.6	2 3 3
				100	12	" 16.1	3 3 3
				100	13	" 14.6	1 2 2
				100	14	" 13.1	2 2 2
11.6	22.5			100	15	" 11.6	1 2 2
						(continued)	

Depth scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE: 34.12 Ft.

PROJECT: RIO ARECIBO PROJECT

INSTALLATION: Jacksonville District

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/.5'
11.6	22.5					11.6	
			CLAY, sandy, some fine silty sand, low plasticity, gray-darkgray. (CL)	100	16	"	2, 2, 5
10.1	24.0					10.1	
			CLAY, some silty clay pockets, little oxidation, traces fine sand, gray-dark gray. (CH)	100	17	"	1, 2, 1
						8.6	
				100	18	"	2, W, 1
						7.1	
				100	19	"	2, 2, 1
						5.6	
				100	20	"	2, 3, 3
4.1	30.0					4.1	
			End of Boring, 30 Ft. Depth				

Soils are field visually classified in accordance with the Unified Soils Classification System.

Ground water elevation at the time of srilling was 24.1 ft.

140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.)

LAB CLASSIFICATIONS

Elev. (Ft.)	Class.	SG	Wn	LL	PL	PI
31.1	MH	----	39%	64	37	27
19.1	CH	----	51%	52	28	24

Depth scale: 22.5, 25, 27.5, 30, 32.5, 35, 37.5, 40, 42.5, 45, 47.5, 50

Hole No.CB-RT-9

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2

1. PROJECT RIO ARECIBO PROJECT	10. SIZE AND TYPE OF BIT See Remarks
2. LOCATION *(Coordinates or Station)* X=404,764 Y=215,740	11. DATUM FOR ELEVATION SHOWN *(TBM or MSL)* MSL
3. DRILLING AGENCY SUELOS INC.	12. MANUFACTURER'S DESIGNATION OF DRILL CME-45
4. HOLE NO. *(As shown on drawing title and file number)* CB-RT-9	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 20 undisturbed: 0
5. NAME OF DRILLER MIGUEL ALVAREZ	14. TOTAL NUMBER OF CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER 24.7 ft.
	16. DATE HOLE STARTED 9/26/95 COMPLETED 9/26/95
7. THICKNESS OF BURDEN 30.0 Ft.	17. ELEVATION TOP OF HOLE 25.69 Ft.
8. DEPTH DRILLED INTO ROCK 0 Ft.	18. TOTAL CORE RECOVERY FOR BORING 100 %
9. TOTAL DEPTH OF HOLE 30 Ft.	19. SIGNATURE OF GEOLOGIST ARNALDO HERNANDEZ

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/.5'
25.7	.0					25.7	
			CLAY, some roots, trace of fine sand, moderate to high plasticity, brown-yellowish brown. (CH)	100	1	SPLIT SPOON 24.2	2, 3, 3
				100	2	" 22.7	5, 2, 2
				100	3	" 21.2	2, 3, 2
				100	4	" 19.7	2, 4, 5
				100	5	" 18.2	1, 2, 2
			Gray to dark gray with traces of fine sand at elevation 18.2 feet.	100	6	" 16.7	2, WH, WH
			Greenish gray with moderate to high plasticity at elevation 16.7 feet.	100	7	" 15.2	1, 1, WH
				100	8	" 13.7	1, 2, 2
				100	9	" 12.2	WH, 1, 1
				100	10	" 10.7	1, 1, 1
				100	11	" 9.2	1, 1, WH
				100	12	" 7.7	1, 1, 1
				100	13	" 6.2	1, 2, 2
				100	14	" 4.7	WH, WH, 1
				100	15	" 3.2	2, WH, WH
						(continued)	

Depth scale: 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

Hole No.CB-RT-9

DRILLING LOG (Cont. Sheet)	ELEVATION TOP OF HOLE 25.69 Ft.	SHEET 2 OF 2
PROJECT RIO ARECIBO PROJECT	INSTALLATION Jacksonville District	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Split Spoon	BLOWS/ .5'
3.2	22.5					3.2	
				100	16	" 1.7	1 / WH / 1
				100	17	" .2	1 / WH / 1
				100	18	" -1.3	WH / 1 / WH
				100	19	" -2.8	WH / 1 / WH
				100	20	" -4.3	1 / 2 / 3
-4.3	30.0		End of Boring, 30.0 Ft. Depth Soils are field visually classified in accordance with the Unified Soils Classification System.			Ground water elevation at the time of drilling was 20.5 ft. 140# HAMMER WITH 30" DROP USED ON 2.0' SPLIT SPOON (1-3/8" I.D. x 2" O.D.)	

LAB CLASSIFICATIONS

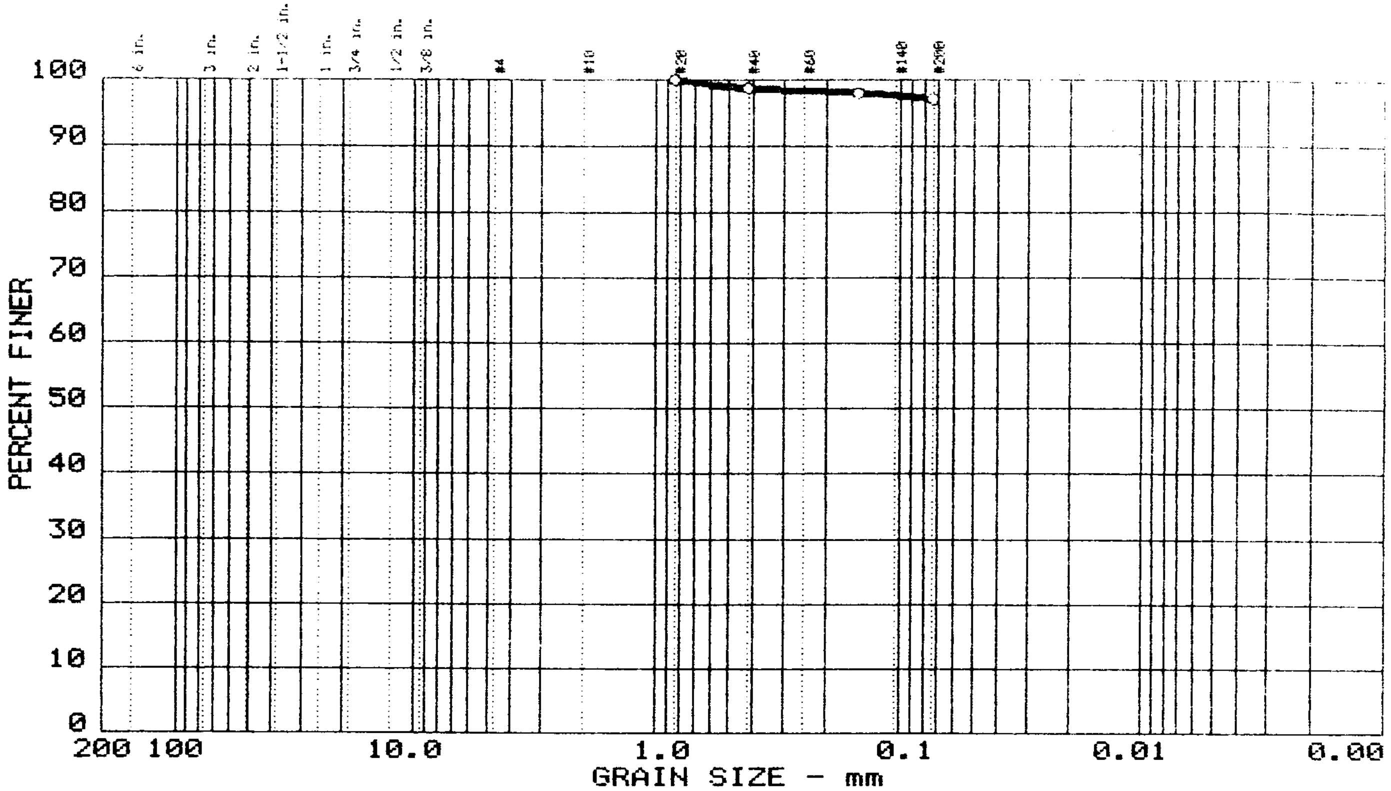
Elev.(Ft.)	Class.	SG	Wn	LL	PL	PI
22.7	CL	2.52	38%	45	25	20
18.2	CL	2.54	37%	41	18	23
12.2	CH	2.58	63%	52	28	24
1.7	CL	----	41%	45	26	19

Depth scale: 22.5, 25, 27.5, 30, 32.5, 35, 37.5, 40, 42.5, 45, 47.5, 50

1.4.6 Laboratory Data

Applicable laboratory data are presented on the following pages. Laboratory data for CB-DC-12 through 17, TP-DC-1 through 5, and TP-BA2-1 through 7 are presented in paragraph 1.4.7.

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	2.9	97.1	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	76	36								

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILT, CLAYEY, LITTLE SAND, YELLOWISH BROWN, GRAY MOTTLED	MH	A-7-5(45)

Project No.:
Project: RIO ARECIBO PROJECT
○ Location: ARECIBO P.R.

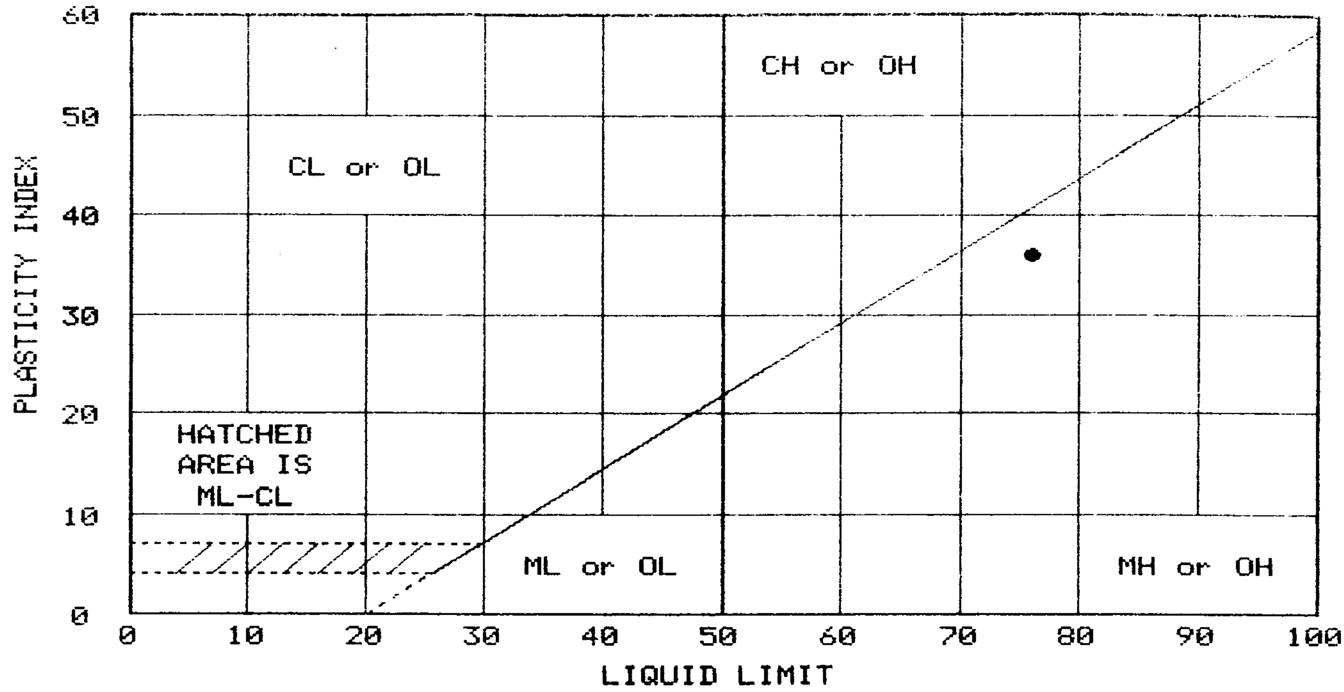
Date: 02-07-96

Remarks:
BOR. C-B-R-A-25
SAMPLE: 3
NAT.MOST.43%

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	USCS	AASHTO
● SILT, CLAYEY, LITTLE SAND, YELLOWISH BROWN, GRAY MOTTLED	76	40	36	97.1	MH	A-7-5(45)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

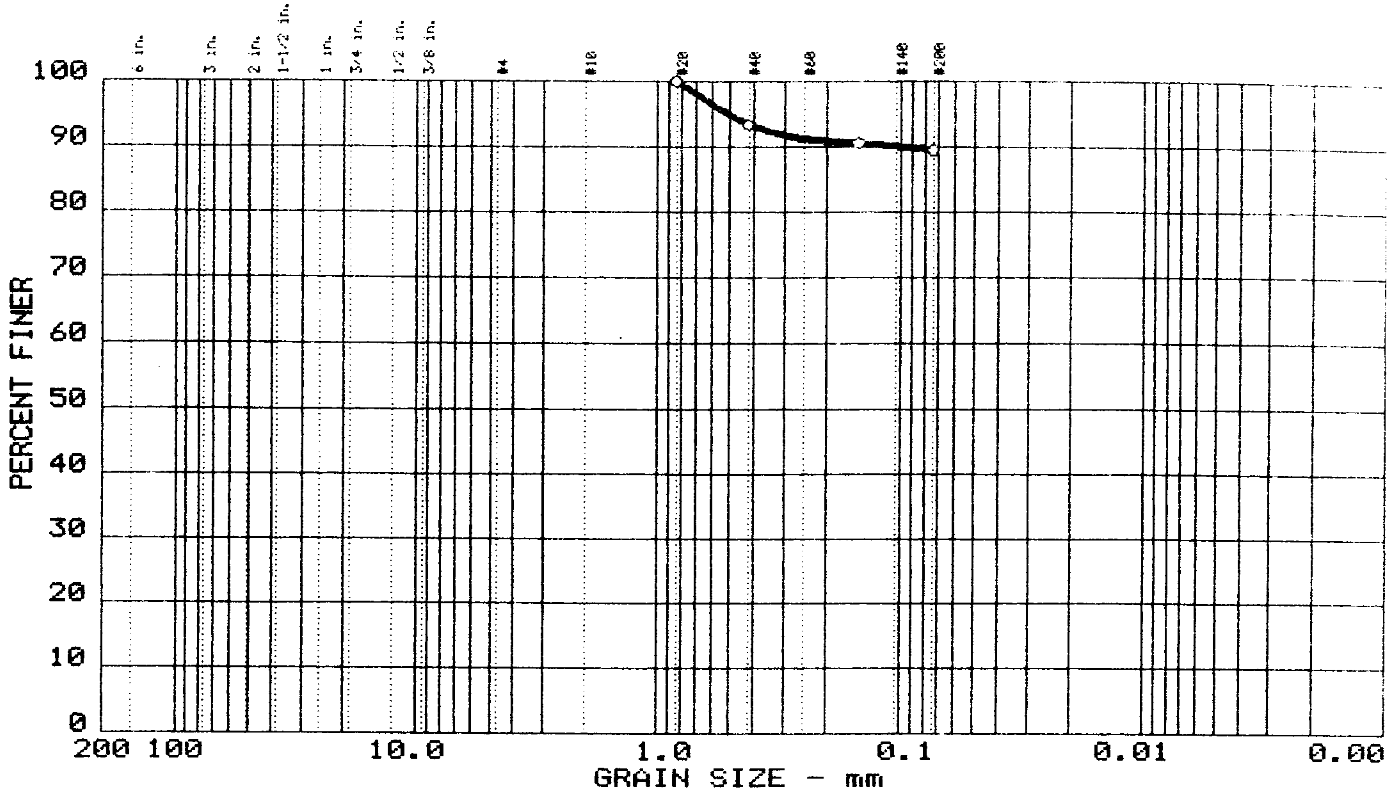
Date: 02-07-96

Remarks:
BOR. C-B-R-A-25
SAMPLE: 3
NAT.MOST. 43%

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Fig. No.______

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	10.5	89.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	72	36								

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILT, CLAYEY, LITTLE SAND, DARK BROWN	MH	A-7-5(39)

Project No.:
Project: RIO ARECIBO PROJECT
○ **Location: ARECIBO P.R**

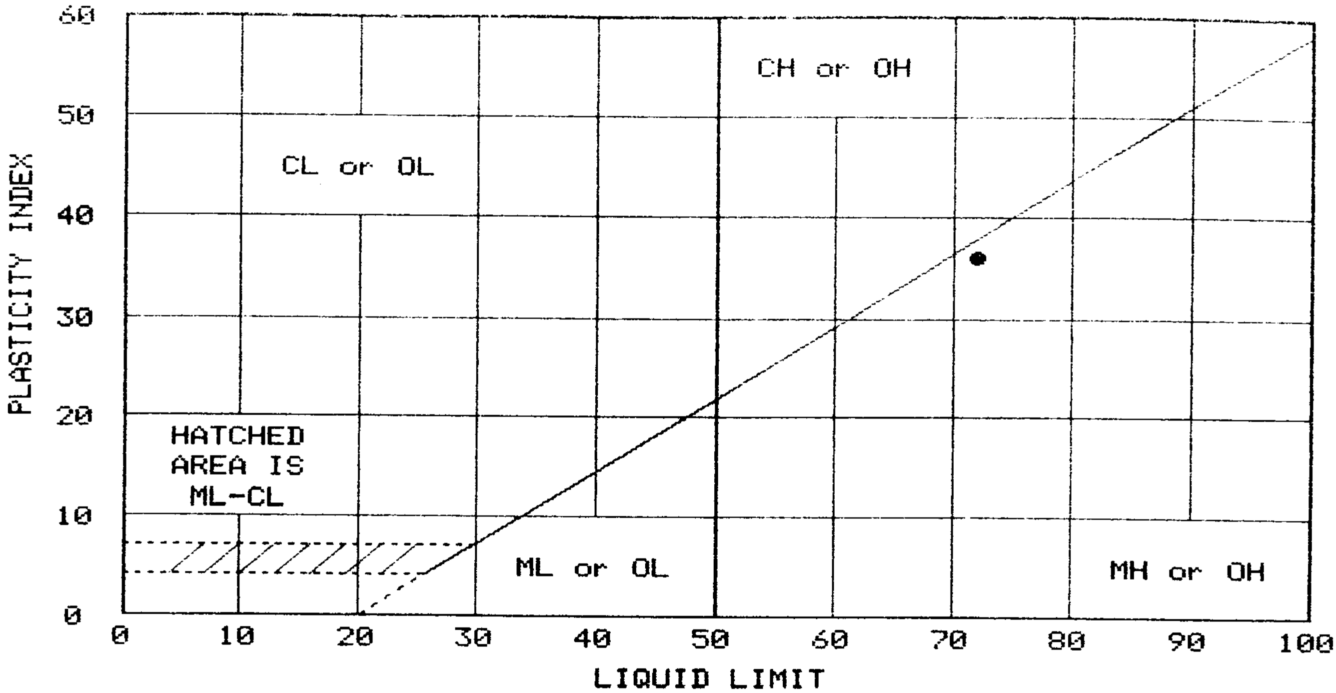
Date: 02-06-96

Remarks:
BOR: C-B-R-A-25
SAMPLE: 8
NAT.MOST.60%

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	USCS	AASHTO
● SILT., CLAYEY ,·LITTLE SAND ;DARK BROWN	72	36	36	89.5	MH	A-7-5(39)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

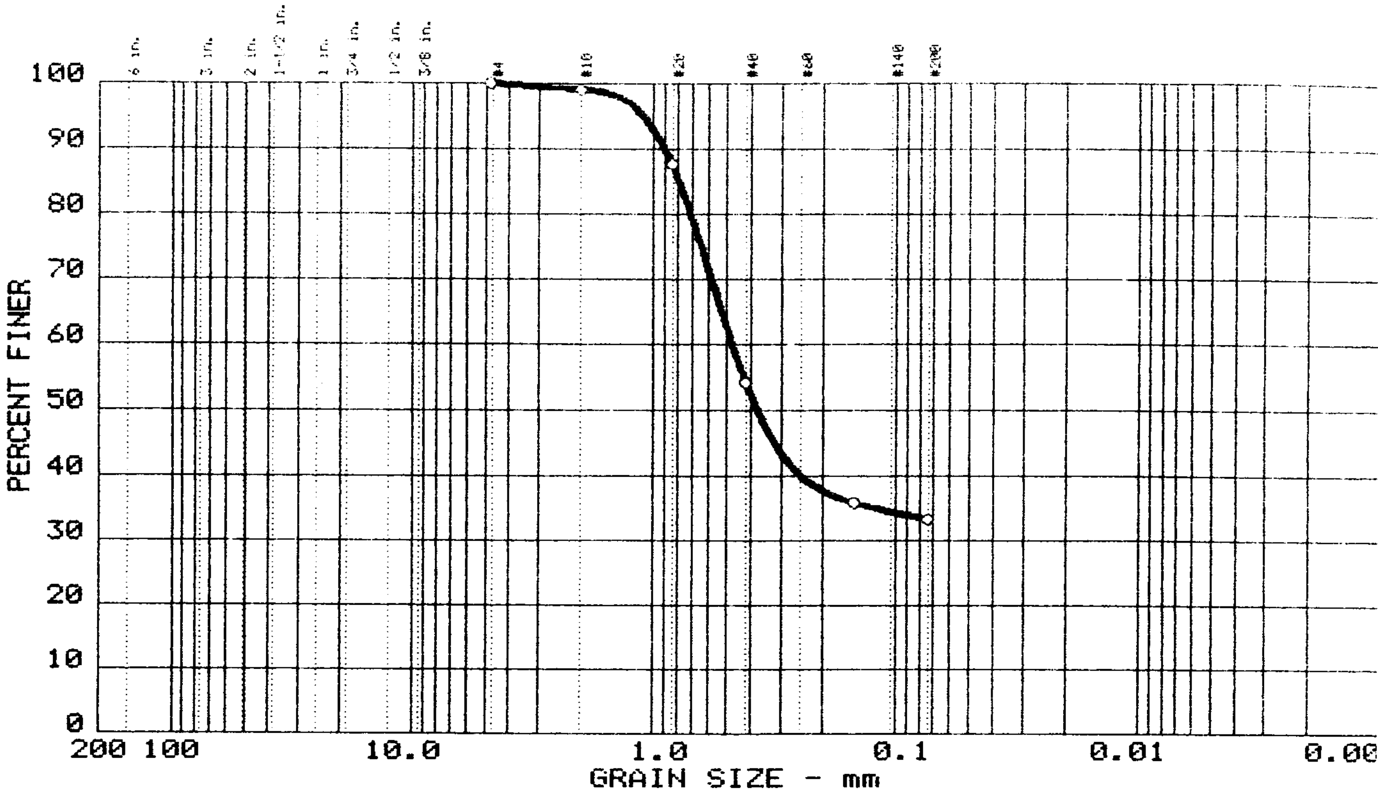
Date: 02-05-96

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-R-A-25
SAMPLE: 8
NAT.MOST. 60%

Fig. No._____

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	66.7	33.3	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	50	23	0.78	0.48	0.38					

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND,CLAYEY,BROWN AND GRAY	SC	A-2-7(2)

Project No.:
Project: RIO ARECIBO PROJECT
○ Location: ARECIBO P.R

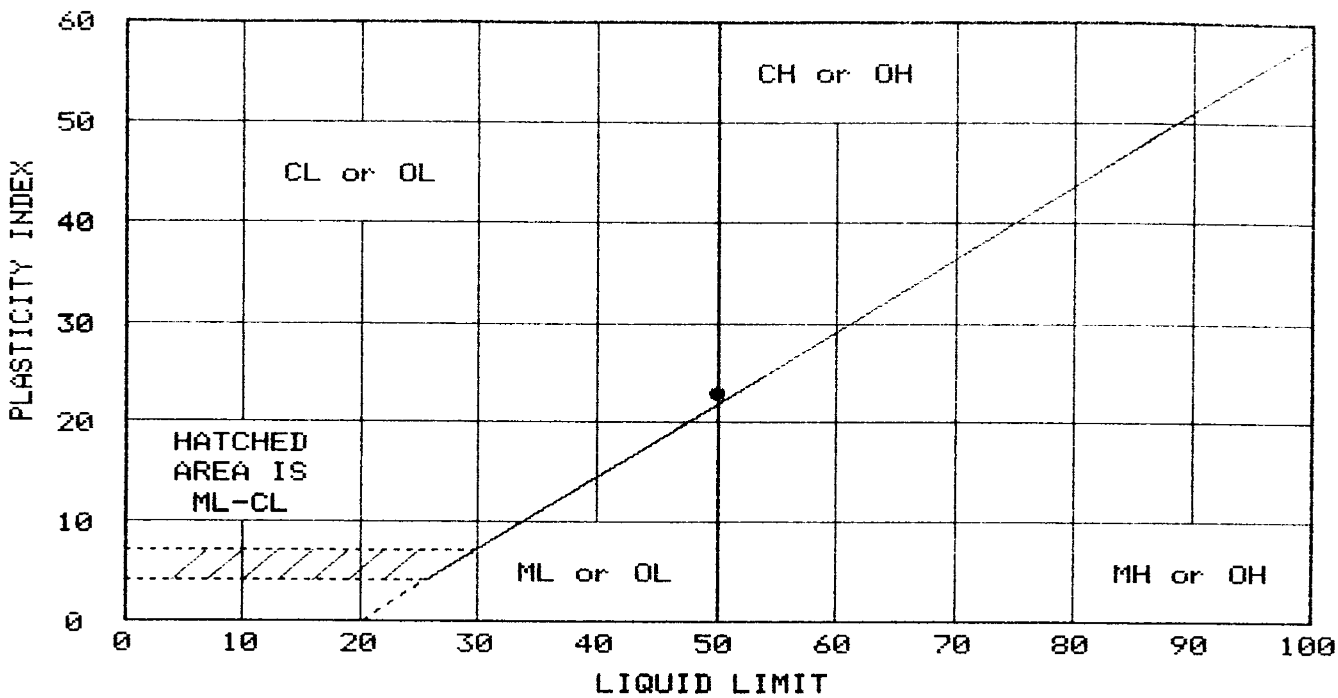
Date: 02-06-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR: C-B-R-A-25
SAMPLE: 11
NAT.MOST.23%

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	USCS	AASHTO
●	SAND, CLAYEY, BROWN AND GRAY	50	27	23	33.5	SC	A-2-7(2)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

Date: 02-05-96

Remarks:
BOR. C-B-R-A-25
SAMPLE: 11
NAT.MOST. 23%

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Fig. No.______

Department of the Army, SO. Atlantic Division Laboratory, Corps of Engineers, 611 SO. Cobb Dr., Marietta, Ga. 30060

VISUAL CLASSIFICATION AND FIELD MOISTURE CONTENT OF SOIL SAMPLES

District	Project	Requisition No.
Jacksonville	Rio Grande de Arecibo Puerto Rico	RM-CW-88-0130
Date Received 10 - 20 September 1988		**Work Order No.** 5697
Location See below		**Date Reported** 14 November 1988
Description Jar Samples of Disturbed Soils		

Lab No.	Hole No.	Sample No.	Depth (ft.)	% Moisture	Visual Classification and/or Remarks
73/ 3278	CB-RGA-1	5	6.0-7.5	43.2	LL 89 PL 31 PI 58 Brown and gray fat clay (CH), with a trace of sand
3279	"	11	13.5-15.0	--	*
3280	"	13	16.5-18.0	--	*
3281	"	18	22.5-24.0	14.6	LL 96 PL 29 PI 67 Tan fat clay (CH), with gravel sizes & a trace of sand
3282	CB-RGA-2	8	9.0-10.5	34.1	LL 55 PL 30 PI 25 Brown and tan inorganic silt, high LL (MH), clayey, with a trace of sand
3283	"	14	18.0-19.5	--	*
3284	"	17	22.5-24.0	40.7	LL 62 PL 30 PI 32 Greenish gray fat clay (CH), with a trace of sand
3285	"	20	27.0-28.5	--	*
3286	CB-RGA-3	3	3.0-4.5	32.5	LL 61 PL 31 PI 30 Brown inorganic silt, high LL (MH), clayey, with a trace of sand
3287	"	10	9.0-10.5	32.6	LL 54 PL 31 PI 23 Brown and gray inorganic silt, high LL (MH), clayey, with a trace of sand
3288	"	23	25.5-27.0	51.7	LL 62 PL 32 PI 30 Gray inorganic silt, high LL (MH), clayey, with a trace of sand

SAD Form 2012
1 Oct 79

Tested by JF, WB Checked by ES Sheet 1 of 4

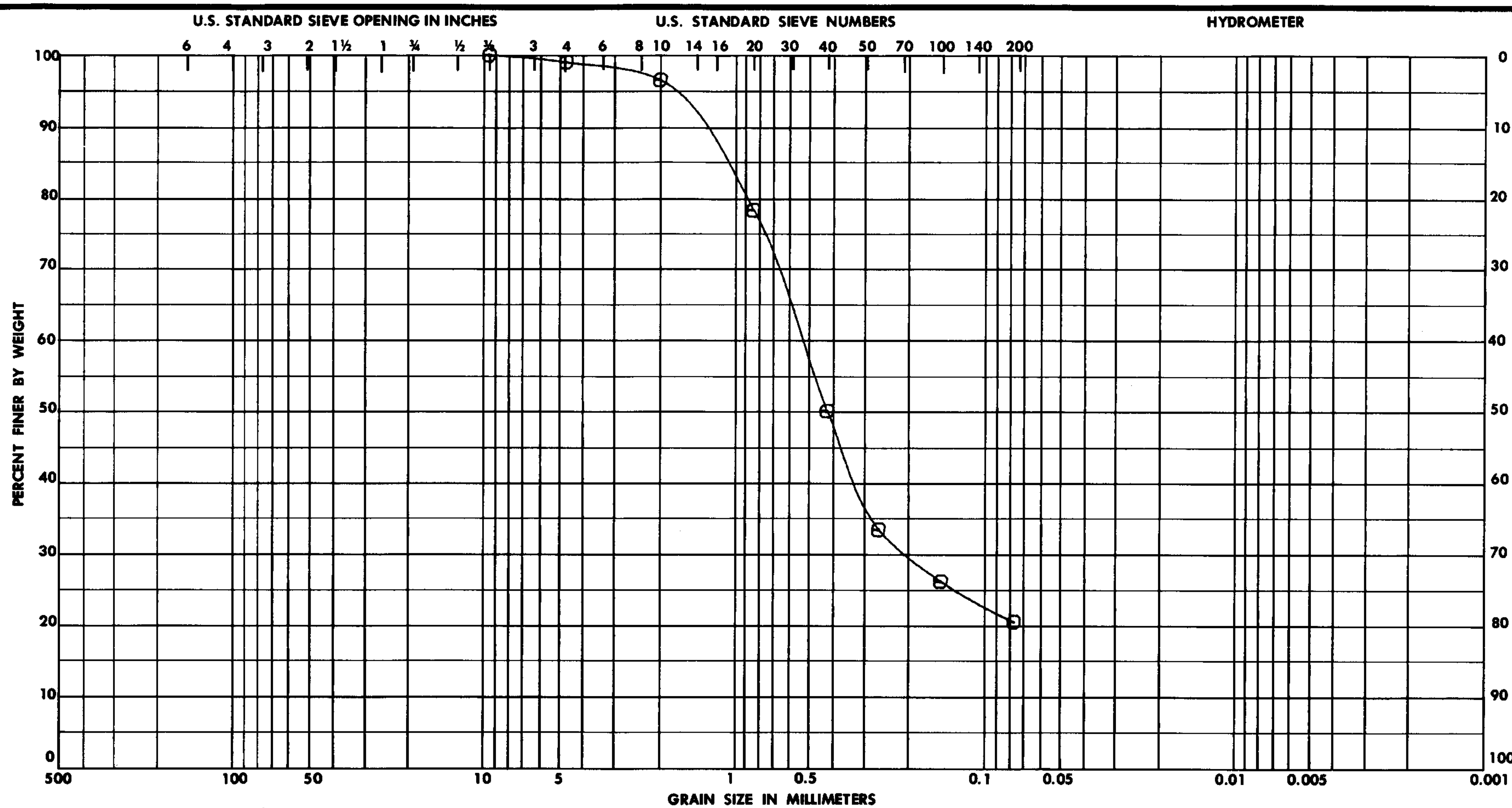
*See visual classification and grain size distribution on ENG Forms 2087.

00320-68

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 5697

Req. No. RM-CW-88-0130



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	~~Elev or~~ Depth	VISUAL Classification	Nat w %	LL	PL	PI
14	18.0-19.5'	SILTY SAND (SM)	--	--	--	--
		BROWN, WITH A TRACE OF GRAVEL				
		SIZE WEATHERED ROCK FRAGMENTS				
		& WITH POCKETS OF BROWN (SC).				

Project RIO GRANDE DE ARECIBO, PR

Area LAB NO. 73/3283

Boring No. CB-RGA-2 . SAMPLE 14

Date 11/10/88

GRADATION CURVES

ENG FORM 1 MAY 63 2087

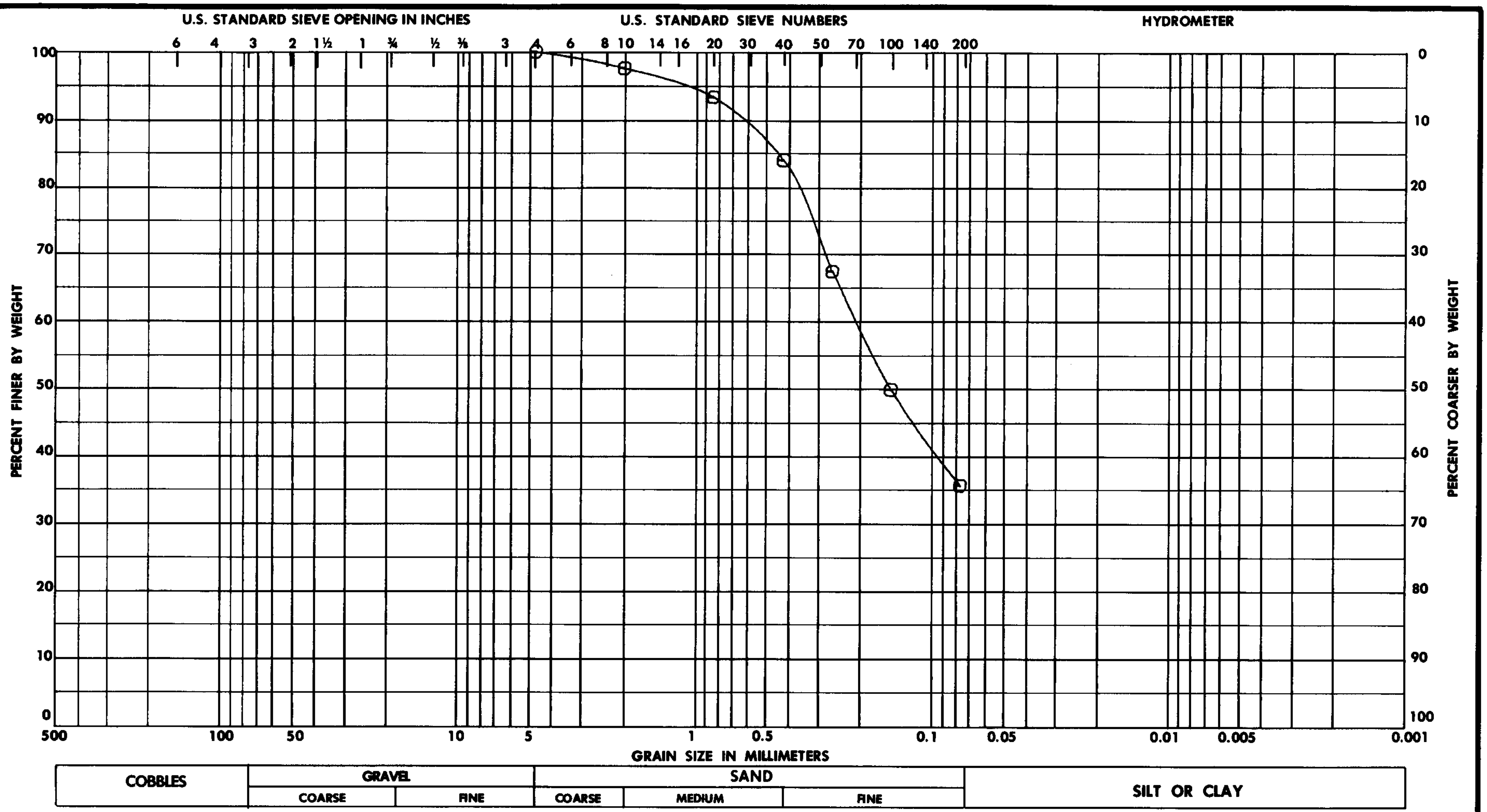
00320-69

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 5697

Req. No. RM-CW-88-0130

00320-70



Sample No.	~~Elev~~ Depth	VISUAL Classification	Nat w %	LL	PL	PI
20	27.0-28.5'	CLAYEY SAND (SC), BROWN WITH	--	--	--	--
		A TRACE OF MICA.				

Project RIO GRANDE DE ARECIBO, PR

Area LAB NO. 73/3285

Boring No. CB-RGA-2 , SAMPLE 20

Date 11/10/88

GRADATION CURVES

ENG FORM 1 MAY 63 2087

LIQUID AND PLASTIC LIMIT TESTS

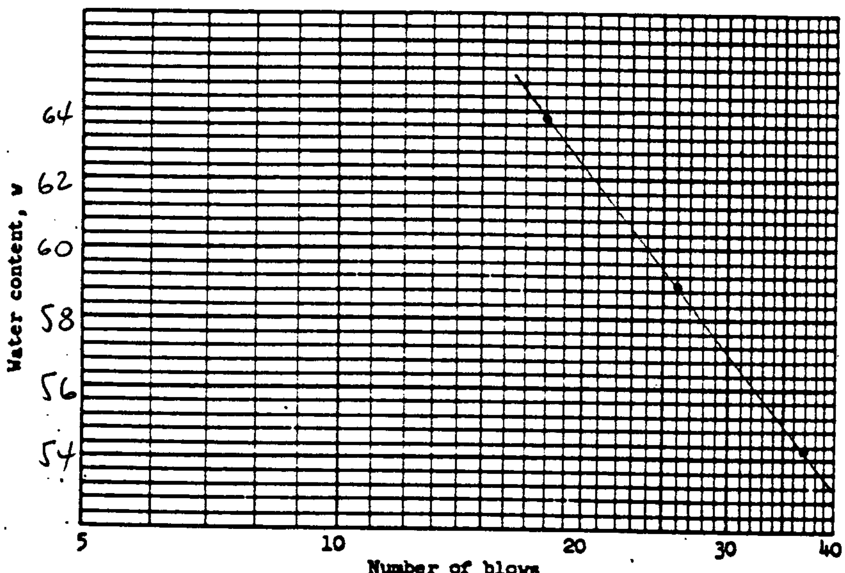
Date 7-2-90

Project Rio Grande de Arecibo

Boring No. CB-RGA-18 Sample No. 3

LIQUID LIMIT

Run No.		1	2	3	4	5	6
Tare No.		3	5	9			
Weight in grams: Tare plus wet soil		34.96	34.19	35.35			
Tare plus dry soil		26.62	26.01	26.07			
Water	W_w						
Tare		11.25	12.11	11.53			
Dry soil	W_s						
Water content	w	54.26	58.85	63.82			
Number of blows		37	26	18			



LL 59.40

PL 25.90

PI 33.50

Symbol from plasticity chart CH

PLASTIC LIMIT

Run No.		1	2	3	4	5	Natural Water Content
Tare No.		34	49				
Weight in grams: Tare plus wet soil		35.29	34.87				
Tare plus dry soil		30.41	30.07				
Water	W_w						
Tare		11.83	11.26				
Dry soil	W_s						
Water content	w	26.26	25.51				
Plastic limit				Ave:	25.90		

Remarks

Technician H. Erazo Computed by H. Erazo Checked by

ENG FORM 1 JUN 65 3838

WATER CONTENT - GENERAL

DATE 6-26-90

PROJECT Río Grande Arecibo

BORING NO. RGA-18

Sample or Specimen No.			3					
Tare No.			74					
Weight in grams	Tare plus wet soil		77.81					
	Tare plus dry soil		62.10					
	Water	W_w						
	Tare		11.78					
	Dry soil	W_s						
Water content		w	31 %	%	%	%	%	%

Sample or Specimen No.								
Tare No.								
Weight in grams	Tare plus wet soil							
	Tare plus dry soil							
	Water	W_w						
	Tare							
	Dry soil	W_s						
Water content		w	%	%	%	%	%	%

Sample or Specimen No.								
Tare No.								
Weight in grams	Tare plus wet soil							
	Tare plus dry soil							
	Water	W_w						
	Tare							
	Dry soil	W_s						
Water content		w	%	%	%	%	%	%

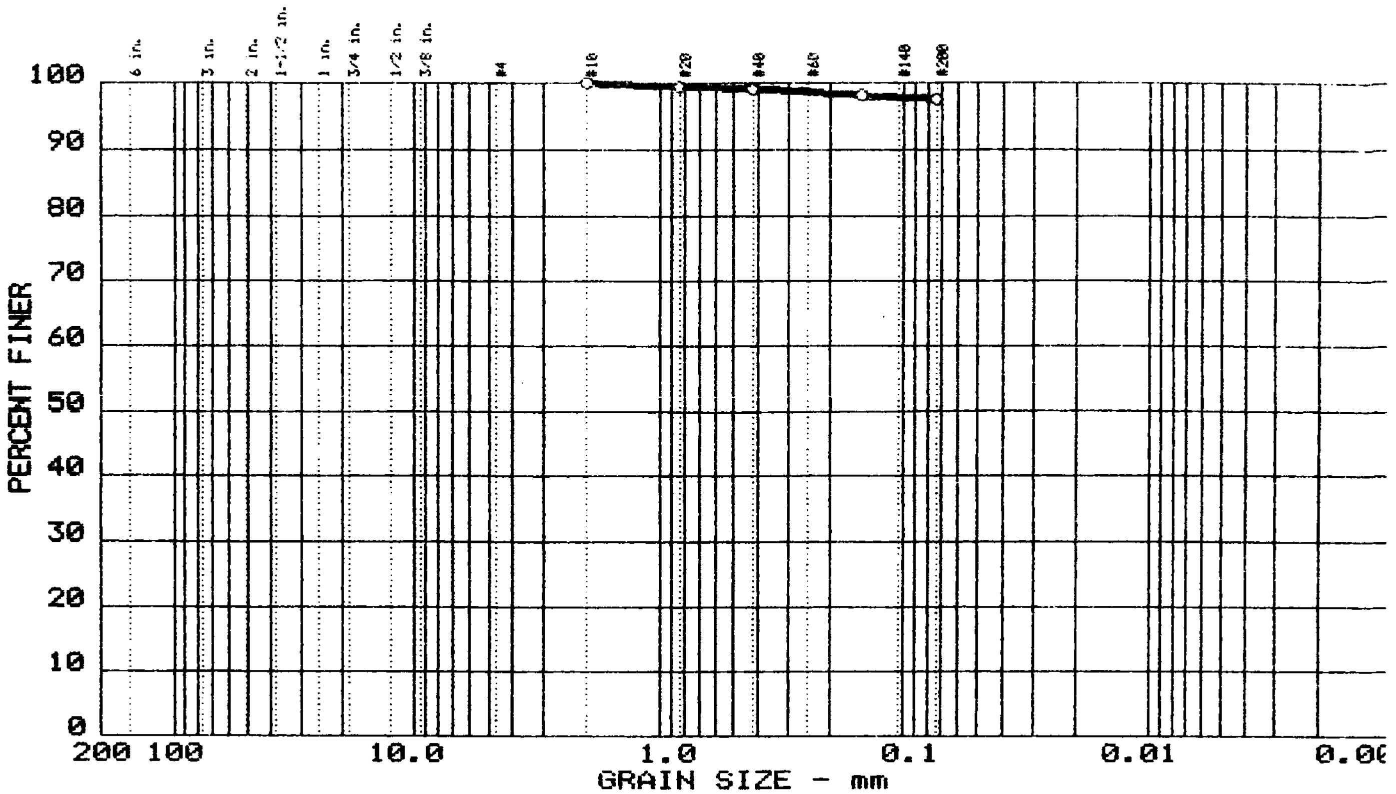
$$w\% = \frac{(\text{tare plus wet soil}) - (\text{tare plus dry soil})}{(\text{tare plus dry soil}) - (\text{tare})} \times 100 = \frac{W_w}{W_s} \times 100$$

Remarks

Technician H. Gayo Computed by H. Gayo Checked by

ENG FORM 1 JUN 65 3835

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	2.5	97.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	80	40								

MATERIAL DESCRIPTION	USCS	AASHTO
o SILT,CLAYEY , ', TRACE SAND, BROWN	MH	A-7-5(50)

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R.

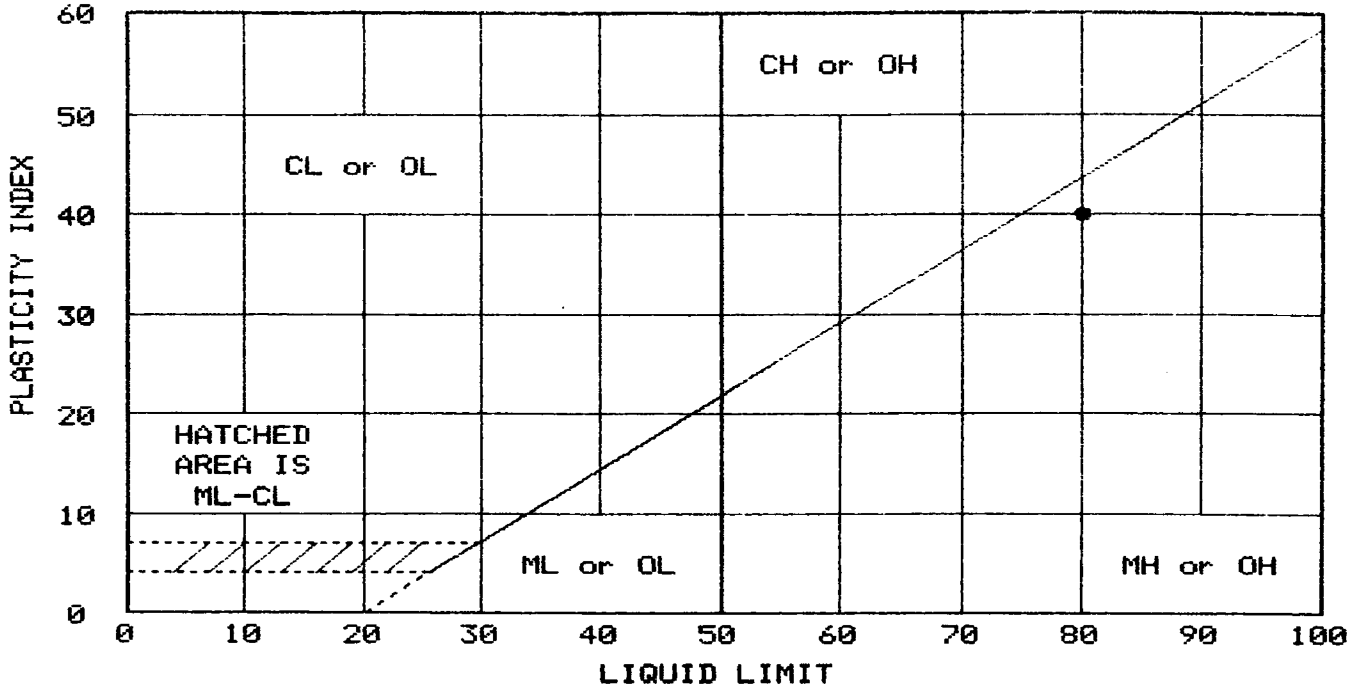
Date: 02-08-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-D-C-1
SAMPLE: 3
NAT. MOST. 49%
SPEC. GRAV. 2.55

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	USCS	AASHTO
●	SILT,CLAYEY . ,TRACE SAND, BROWN	80	40	40	97.5	MH	A-7-5(50

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

Date: 02-19-96

Remarks:
BOR. C-B-D-C-1

SAMPLE: 3

NAT.MOST. 49%

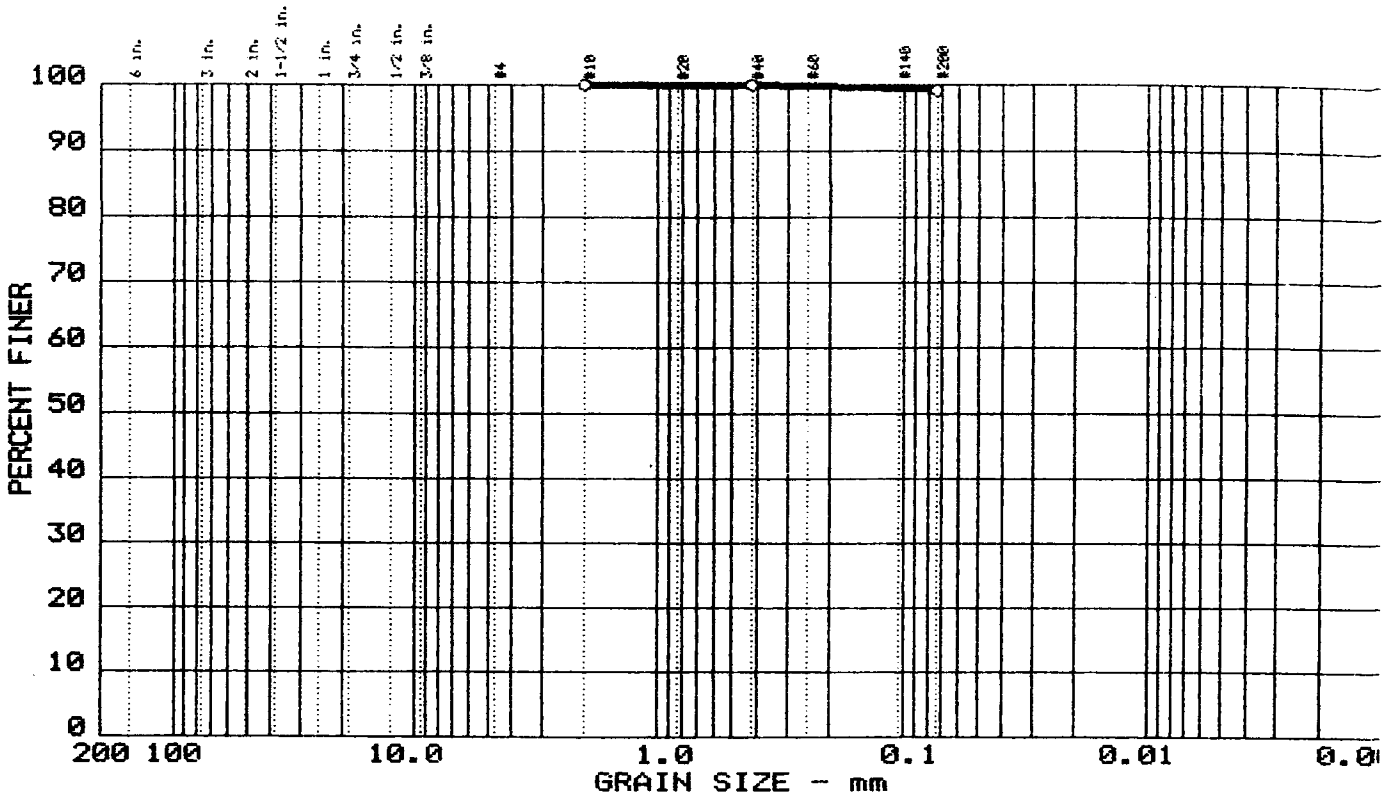
SPEC. GRAV. 2.55

LIQUID AND PLASTIC LIMITS TEST REPORT

SUELOS INC.

Fig. No._____

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	0.8	99.2	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	55	23								

MATERIAL DESCRIPTION	USCS	AASHTO
o SILT, CLAYEY, YELLOWISH BROWN	MH	A-7-5(28)

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R

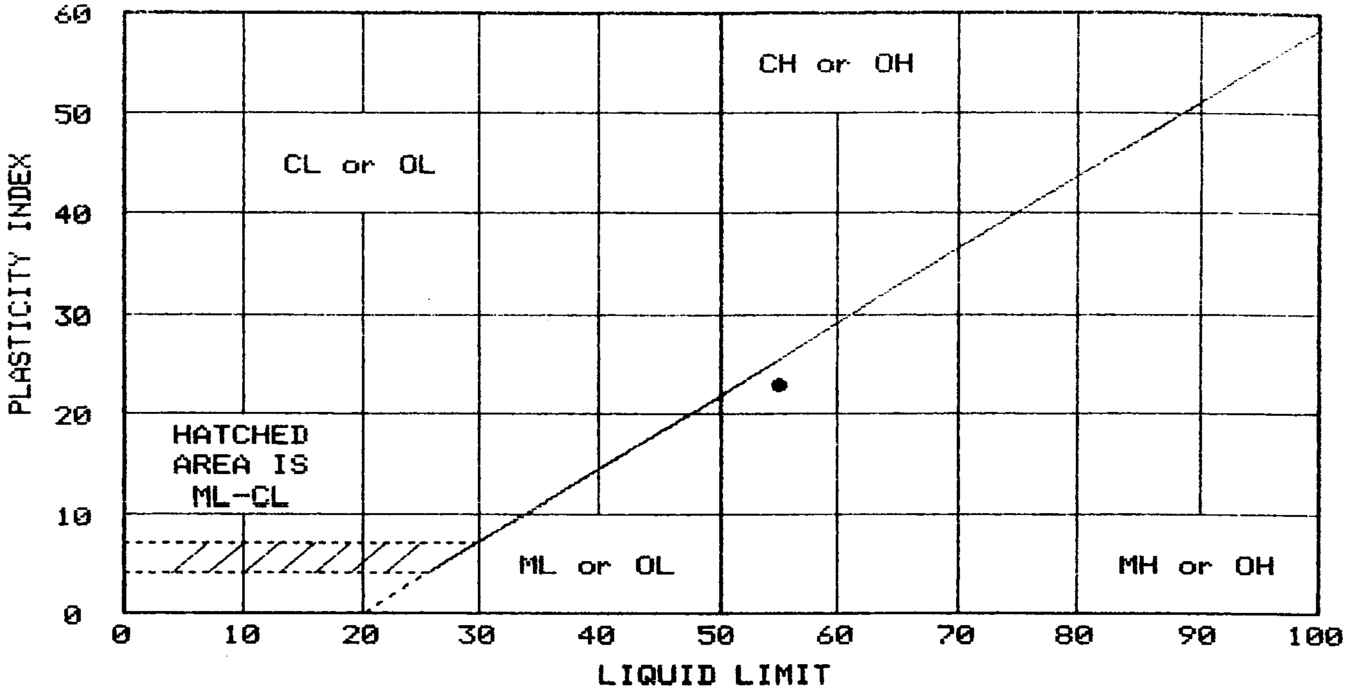
Date: 02-05-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR: C-B-D-C-2
SAMPLE: 6
NAT.MOST.36%

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	USCS	AASHTO
• SILT, CLAYEY , YELLOWISH BROWN	55	32	23	99.2	MH	A-7-5(28)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

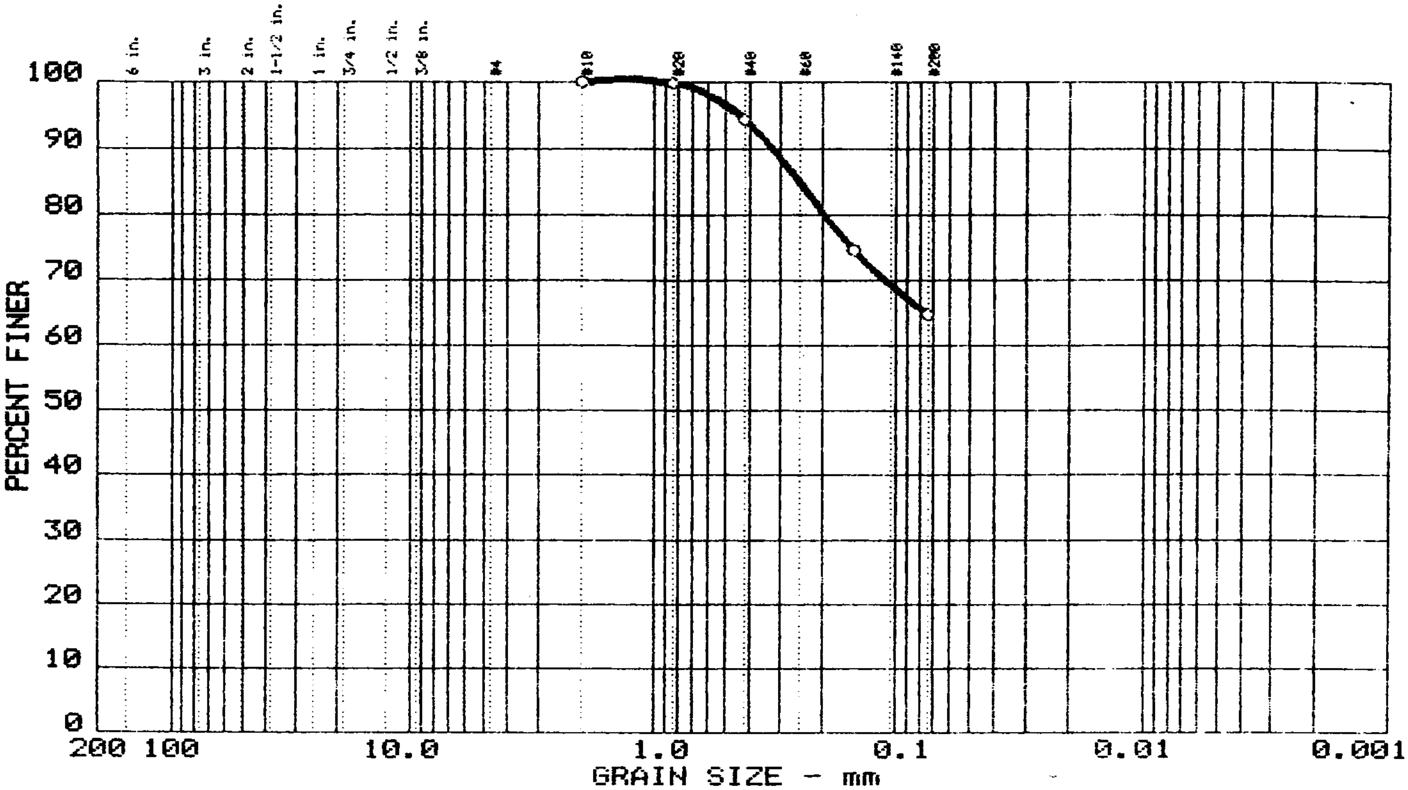
Date: 02-05-96

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-D-C-2
SAMPLE: 6
NAT.MOST. 36%

Fig. No.____

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	35.1	64.9	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	44	17	0.25							

	MATERIAL DESCRIPTION	USCS	AASHTO
o	SILT , CLAYEY , SANDY ,YELLOWISH BROWN	ML	A-7-6(10)

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R.

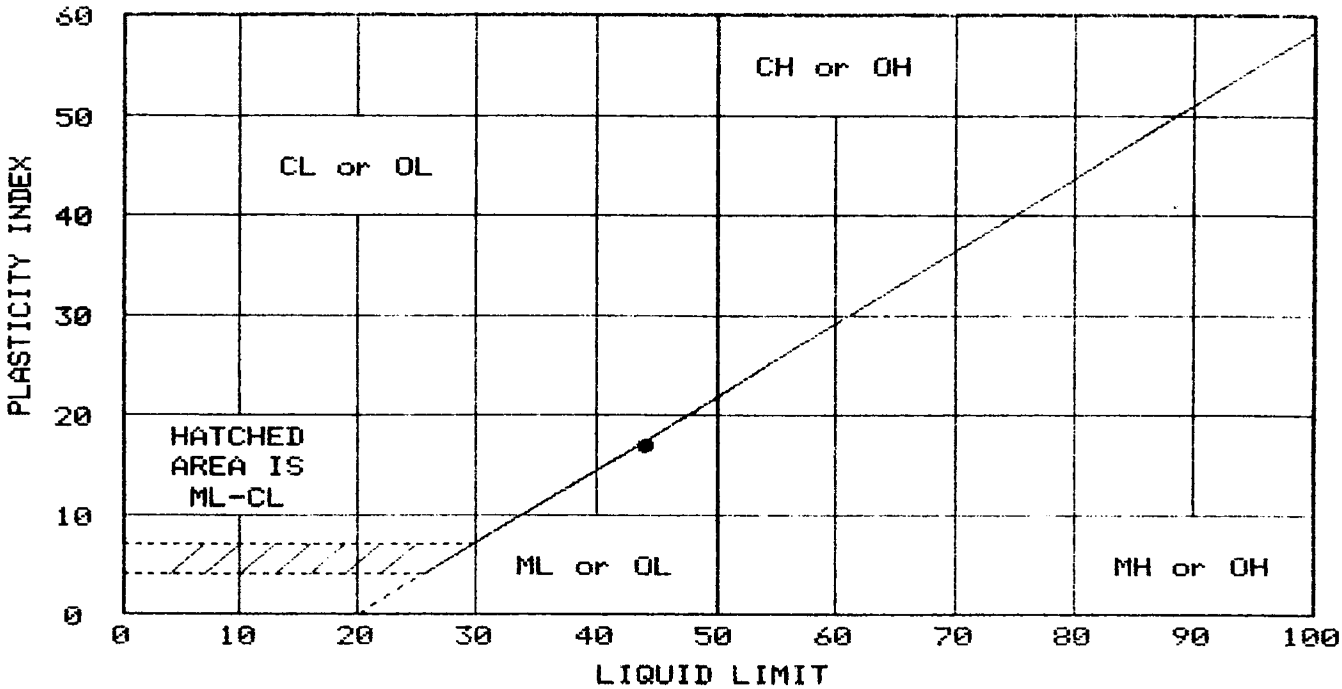
Date: 03-05-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-D-C-2
SAMPLE: 10
NAT.MOST. 29%

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	USCS	AASHTO
● SILT, CLAYEY, SANDY, YELLOWISH BROWN	44	27	17	64.9	ML	A-7-6(10)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

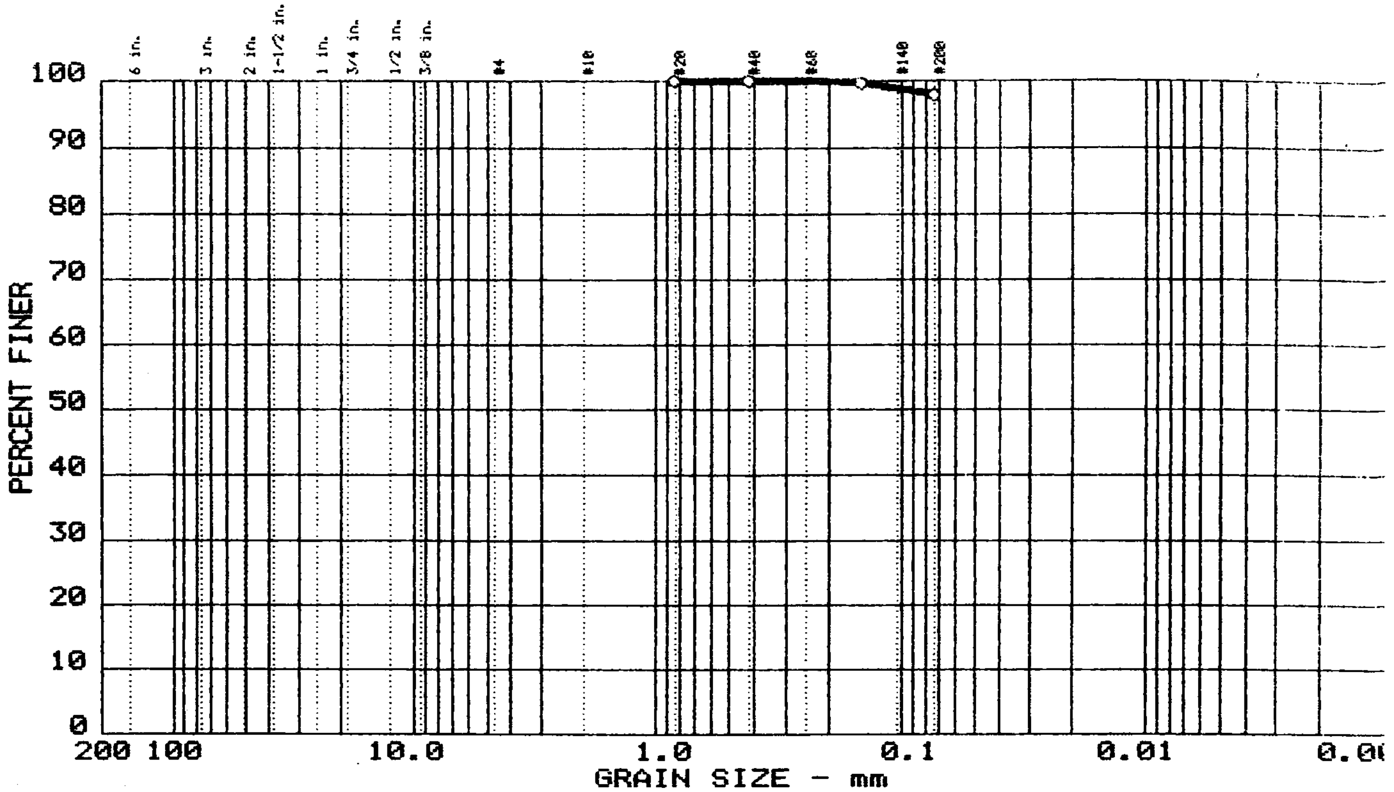
Date: 03-05-96

Remarks:
BOR. C-B-D-C-2
SAMPLE: 10
NAT.MOST. 29%

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Fig. No.______

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	2.1	97.9	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	52	21								

MATERIAL DESCRIPTION	USCS	AASHTO
o **SILT, CLAYEY, TRACE SAND, DARK BROWN**	MH	A-7-5(26)

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R.

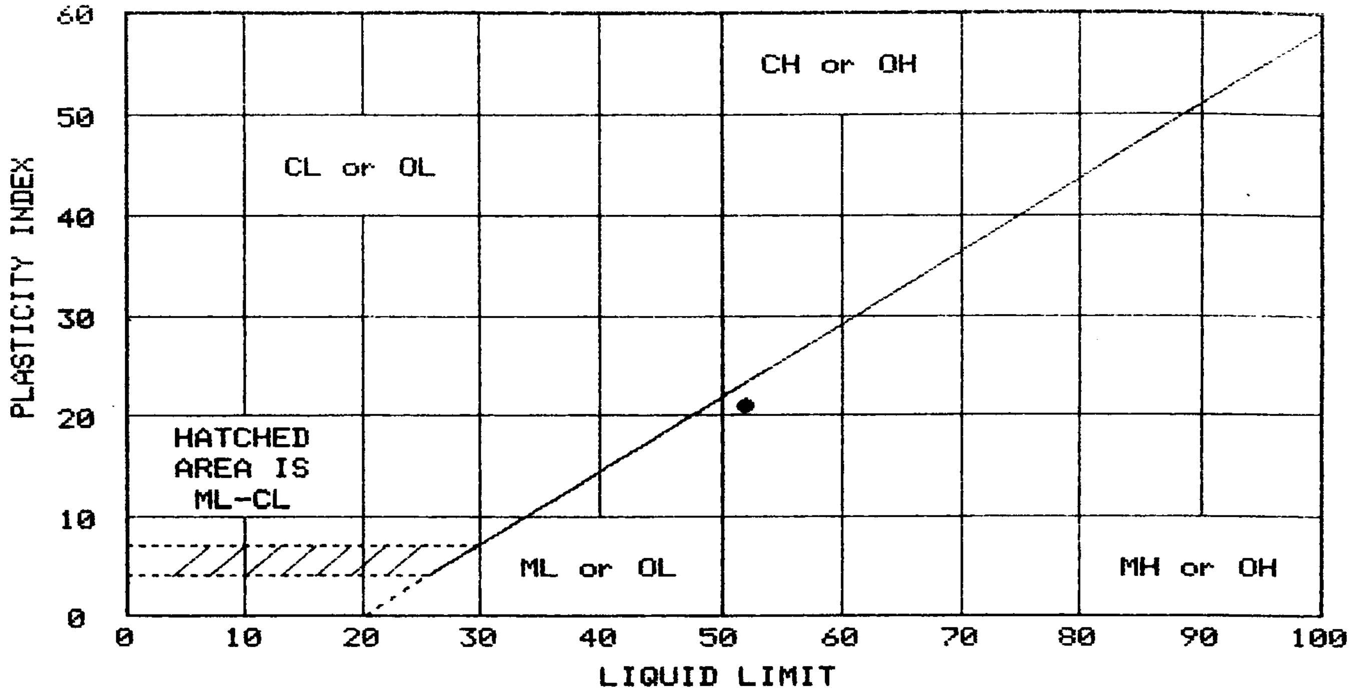
Date: 02-07-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-D-C-3
SAMPLE: 3
NAT.MOST.35%

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	USCS	AASHTO
● SILT, CLAYEY, TRACE SAND, DARK BROWN	52	31	21	97.9	MH	A-7-5(26

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

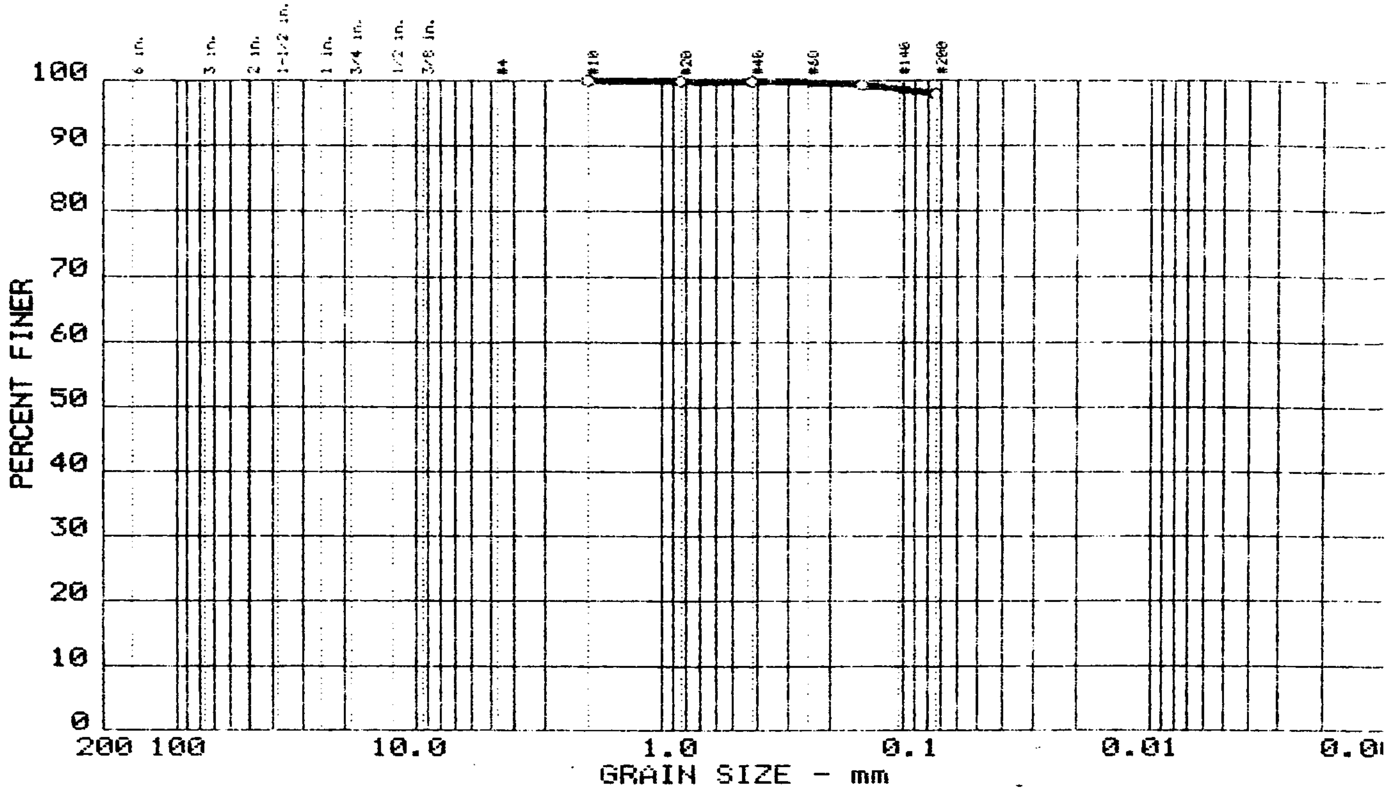
Date: 02-07-96

Remarks:
BOR. C-B-D-C-3
SAMPLE: 3
NAT.MOST. 35%

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Fig. No.____

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	2.0	98.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	56	24								

MATERIAL DESCRIPTION	USCS	AASHTO
o SILT , CLAYEY , TRACE SAND , YELLOWISH BROWN , GRAY POCKETS	MH	A-7-5(29)

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R.

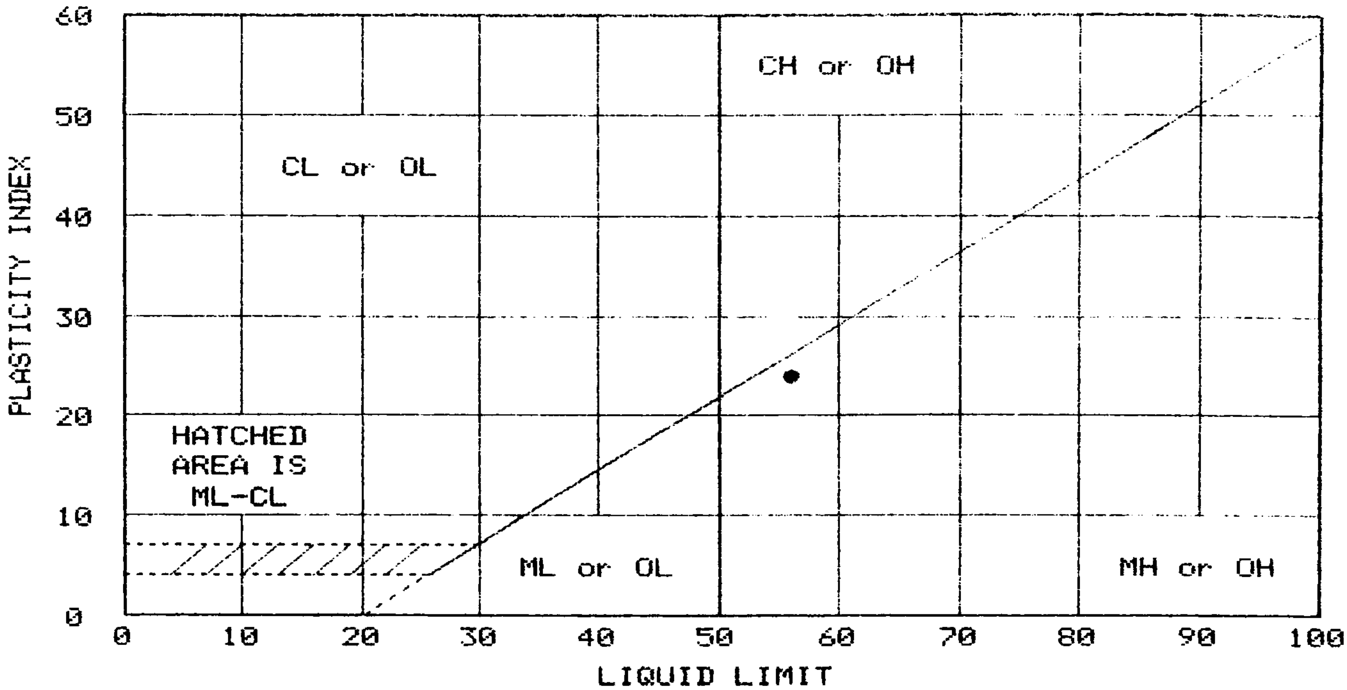
Date: 03-14-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR: C-B-D-C-3
SAMPLE: 10
NAT. MOST. 35%

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	USCS	AASHTO
● SILT, CLAYEY, TRACE SAND, YELLOWISH BROWN, GRAY POCKETS	56	32	24	97.9	MH	A-7-5(29)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

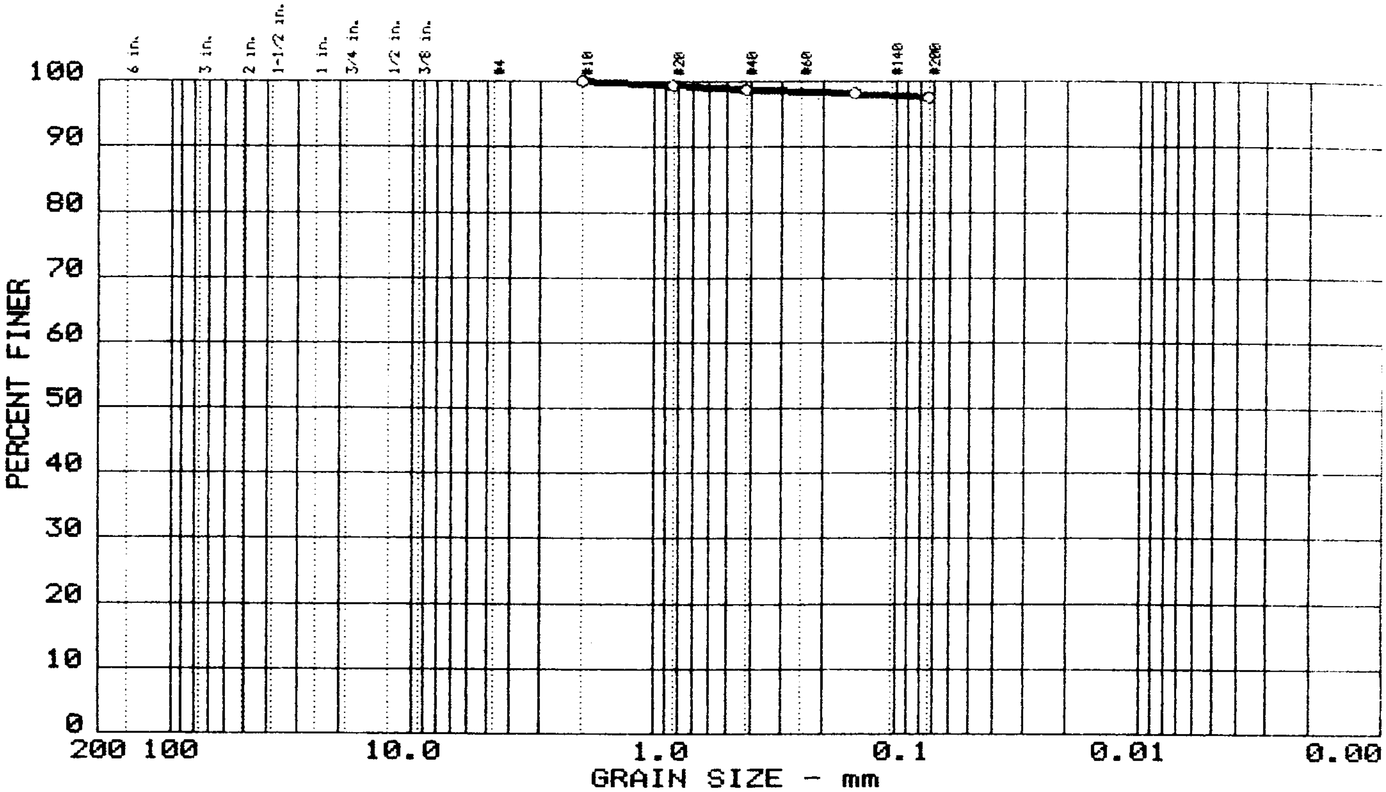
Date: 03-14-96

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Remarks:
BOR: C-B-D-C-3
SAMPLE: 10
NAT.MOST. 35%

Fig. No.____

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	2.5	97.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	44	20								

MATERIAL DESCRIPTION	USCS	AASHTO
○ CLAY , SILTY , TRACE SAND , YELLOWISH BROWN	CL	A-7-6(22)

Project No.:
Project: RIO ARECIBO PROJECT
○ Location: ARECIBO P.R

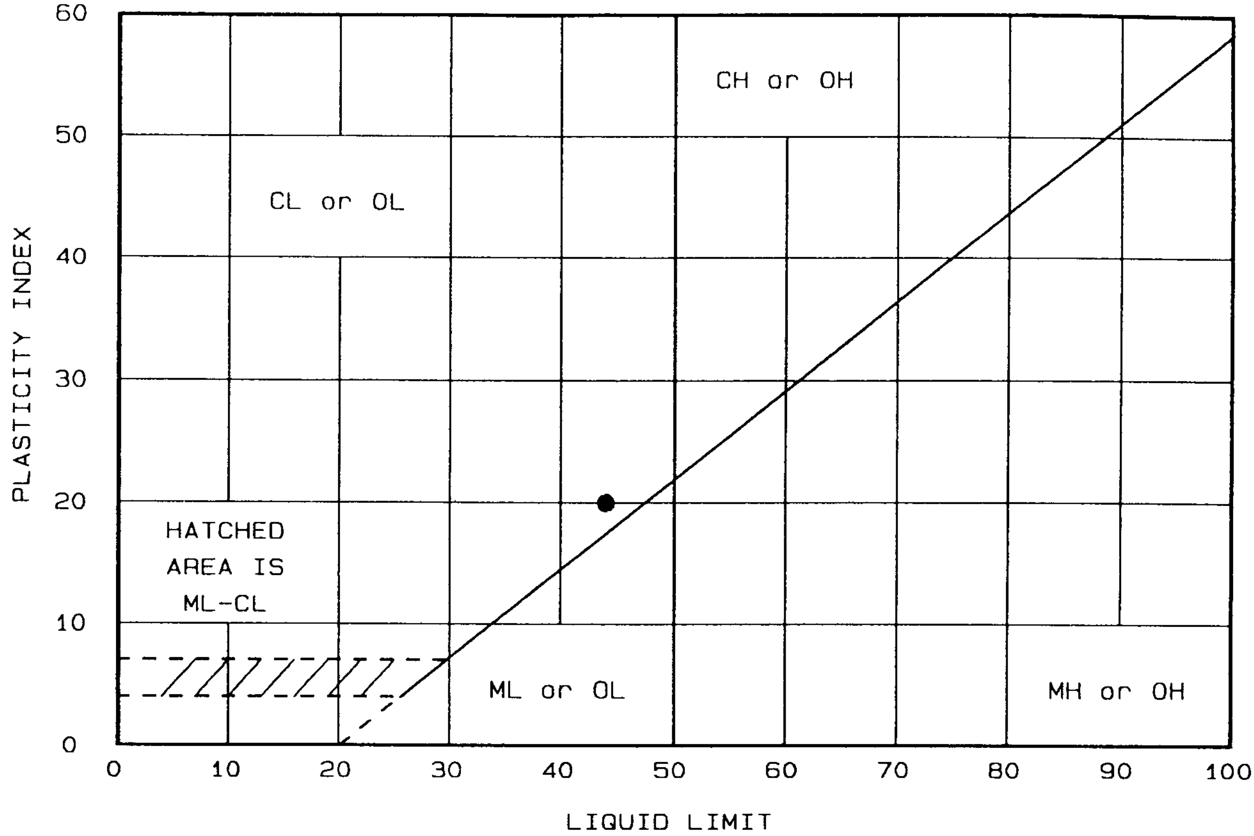
Date: 02-06-96

Remarks:
BOR: C-B-D-C-4
SAMPLE: 6
NAT.MOST.36%

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	ASTM D 2487-90
● **CLAY, SILTY, TRACE SAND, YELLOWISH BROWN**	44	24	20	97.5	CL, Lean clay

Project No.:
Project: RIO ARECIBO PROJECT

Client: USACE
Location: ARECIBO P.R.

Date: 2-5-96

LIQUID AND PLASTIC LIMITS TEST REPORT

SUELOS INC.

Remarks:

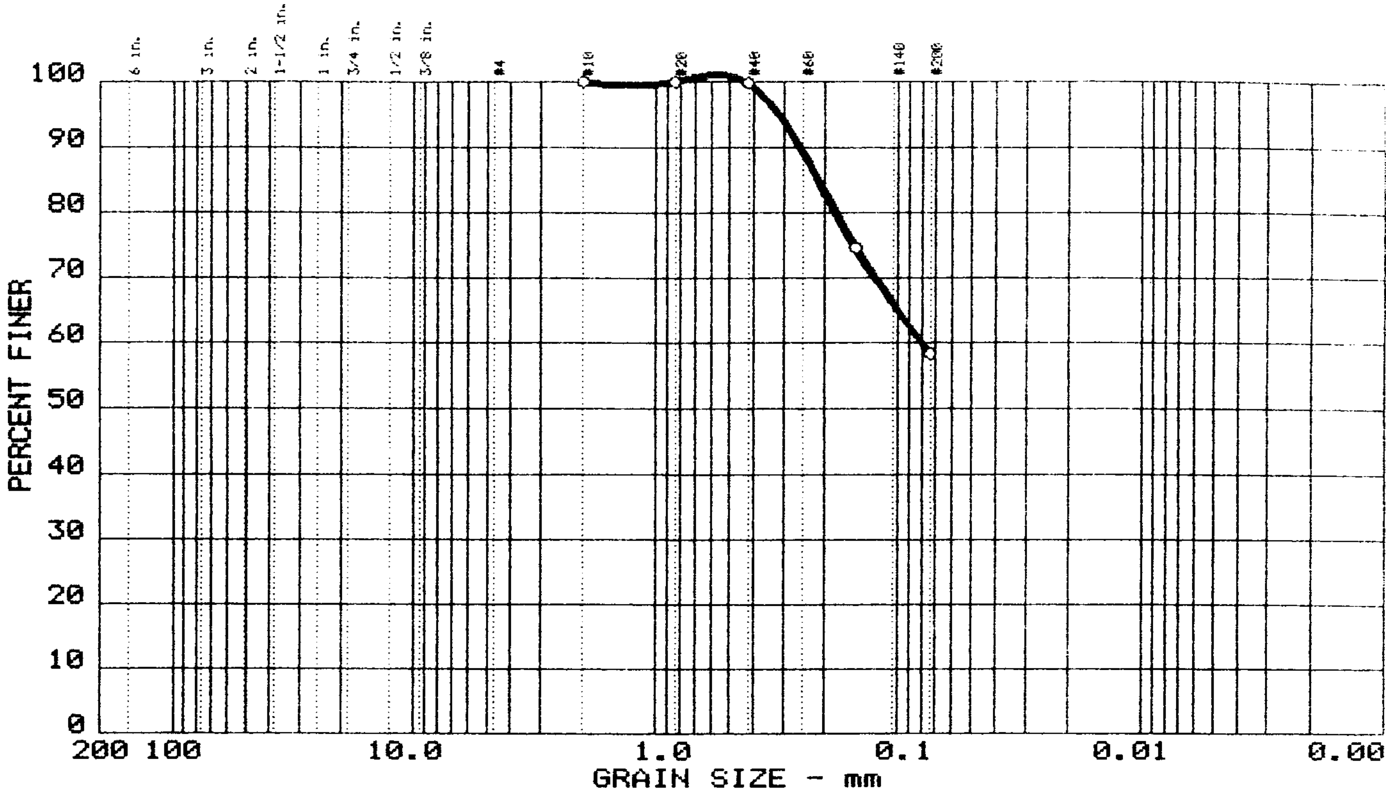
BOR. C-B-D-C-4

SAMPLE NO. 6

NAT. MOIST. 36%

Fig. No. 2

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75 mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	41.7	58.3	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	35	10	0.21	0.08						

MATERIAL DESCRIPTION	USCS	AASHTO
o SILT ,SANDY,LITTLE CLAY,YELLOWISH BROWN	ML	A-4(4)

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R

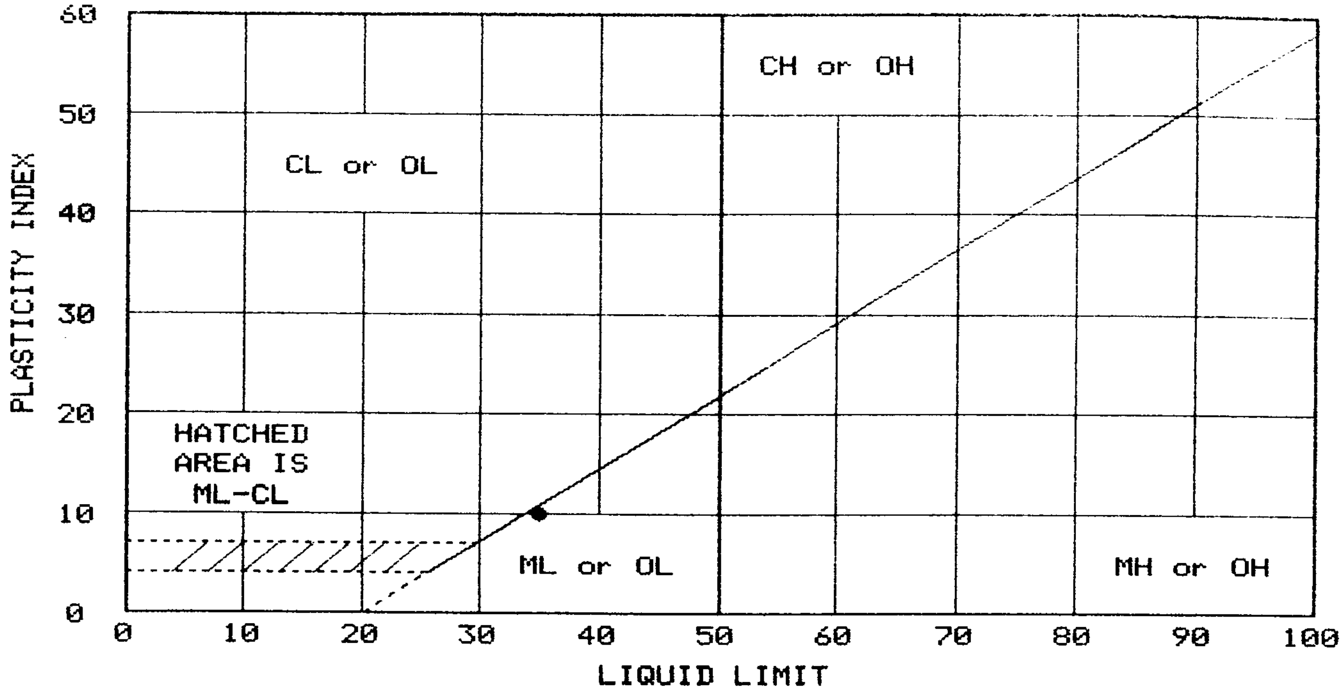
Date: 02-05-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR: C-B-D-C-5
SAMPLE: 5
NAT.MOST.30%
SPEC. GRAV. 2.60

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	USCS	AASHTO
●	SILT ,SANDY,LITTLE CLAY, YELLOWISH BROWN	35	25	10	58.3	ML	A-4(4)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

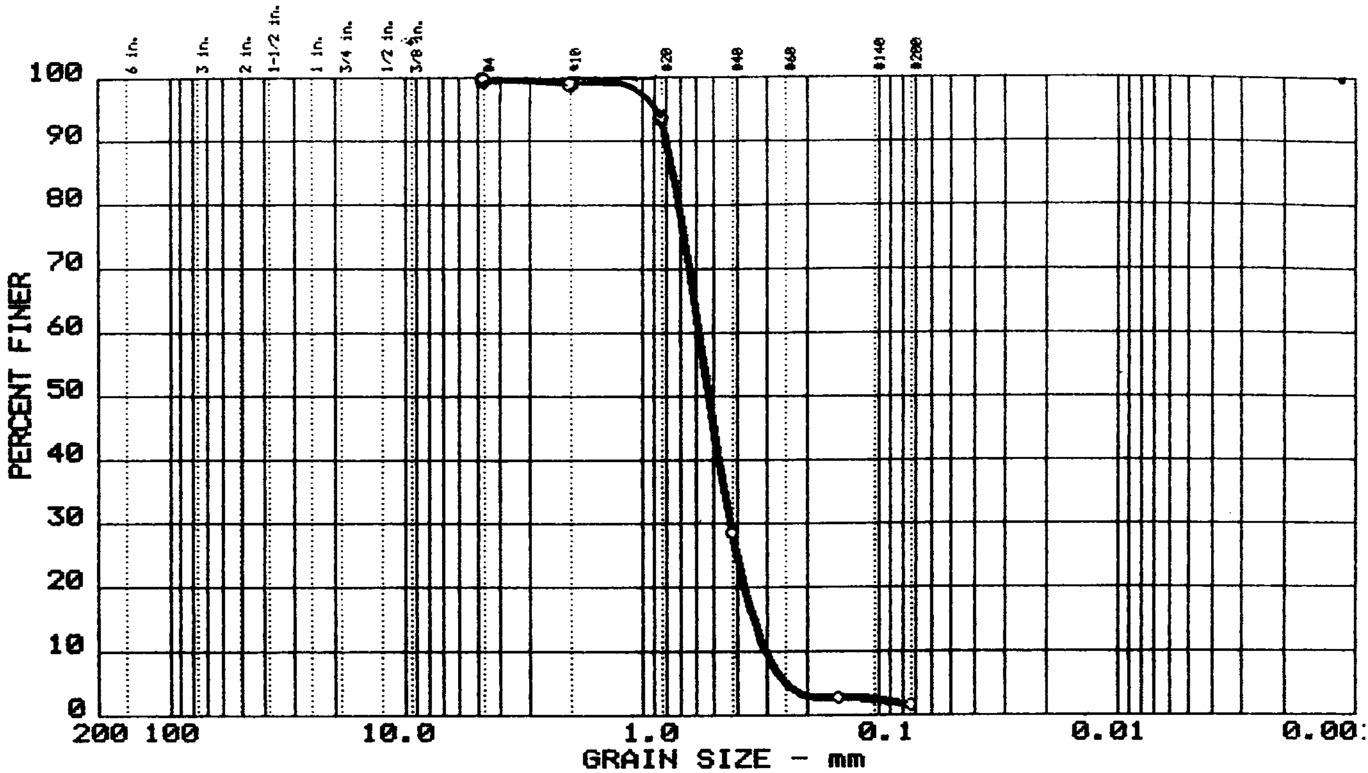
Date: 02-05-96

Remarks:
BOR. C-B-D-C-5
SAMPLE: 5
NAT.MOST. 30%
SPEC. GRAV. 2.60

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Fig. No.______

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	98.4	1.6	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o			0.75	0.58	0.53	0.428	0.3396	0.3027	1.04	1.9

MATERIAL DESCRIPTION	USCS	AASHTO
o SAND, LITTLE SILT, PALE BROWN	SP	A-1-b

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R

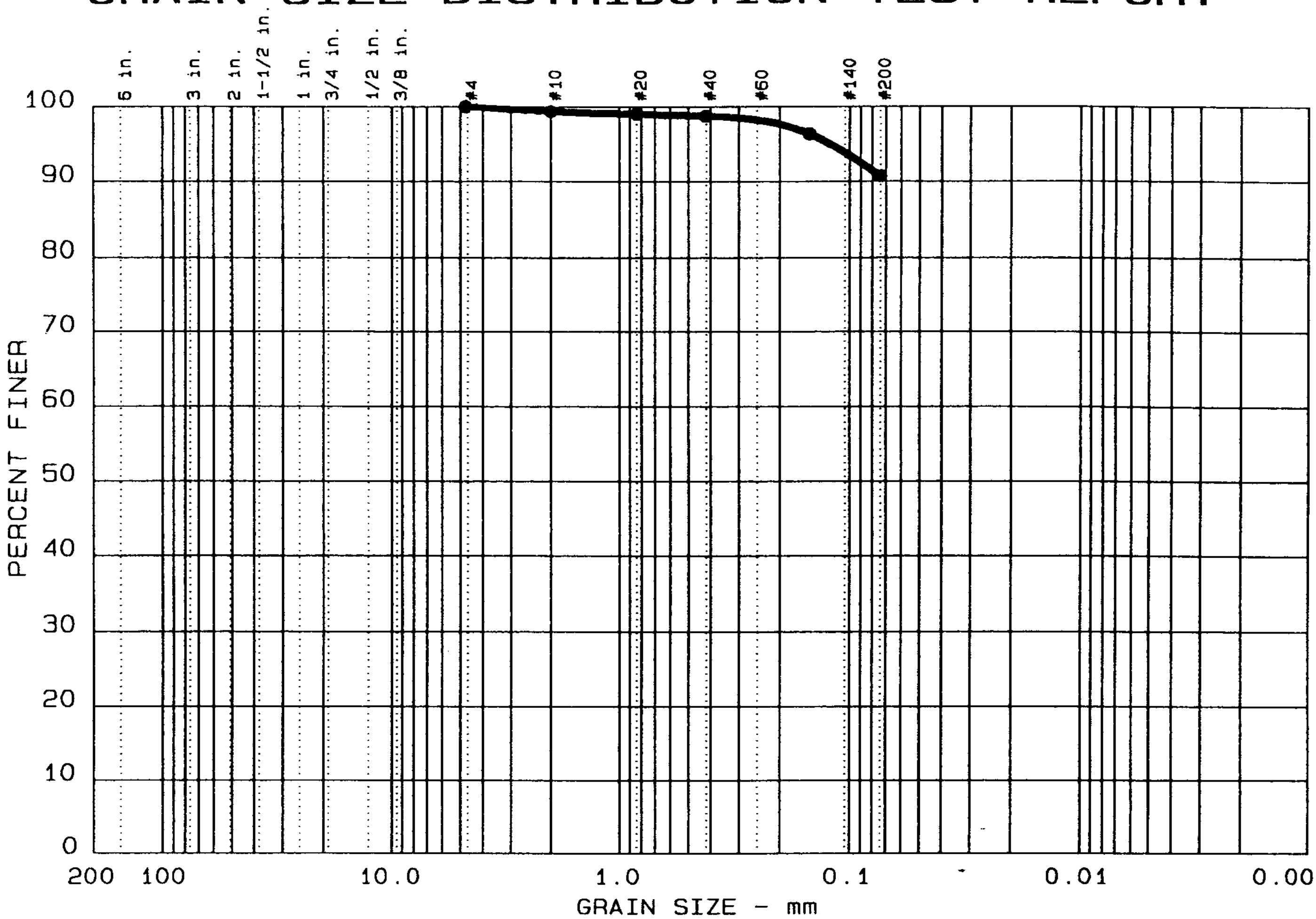
Date: 02-05-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR: C-B-D-C-5
SAMPLE: 8
NAT.MOST.25%

Figure No.______

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75 mm	% GRAVEL	% SAND	% SILT	% CLAY
●	4	0.0	0.0	9.3	90.7	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	66	40								

	MATERIAL DESCRIPTION	USCS	AASHTO
●	CLAY, SILTY, DARK BROWN	CH	A-7-6 (41)

Project No.:
Project: RIO ARECIBO PROJECT
● Location:

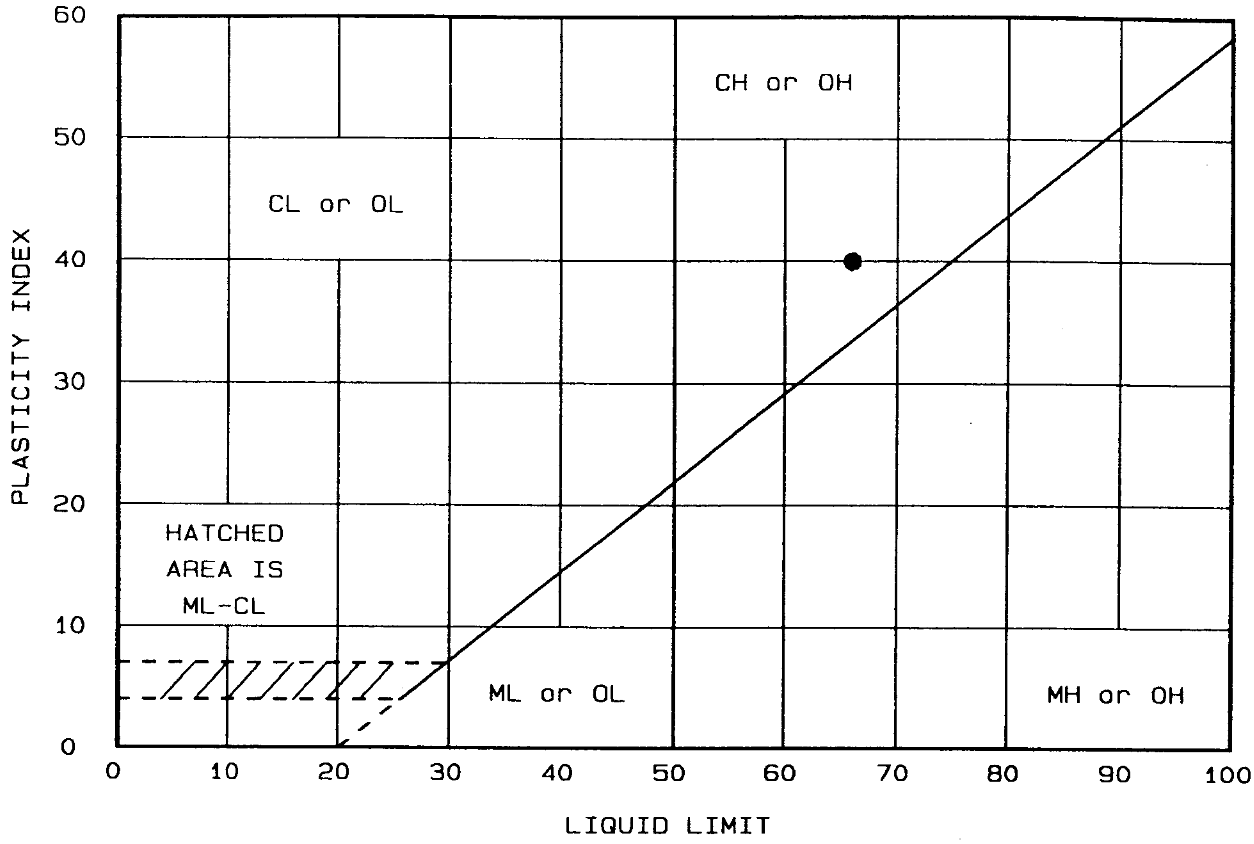
Date: 3-5-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-D-C-7
SAMPLE NO. 3
NAT. MOIST. 47%
SPEC. GRAV. 2.56

Figure No. ______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	- ASTM D 2487-90
● CLAY, SILTY, DARK BROWN	66	26	40	90.7	CH, Fat clay

Project No.:
Project: RIO ARECIBO PROJECT

Client: USACE
Location: ARECIBO P.R.

Date: 3-5-96

LIQUID AND PLASTIC LIMITS TEST REPORT

SUELOS INC.

Remarks:

BOR. C-B-D-C-7

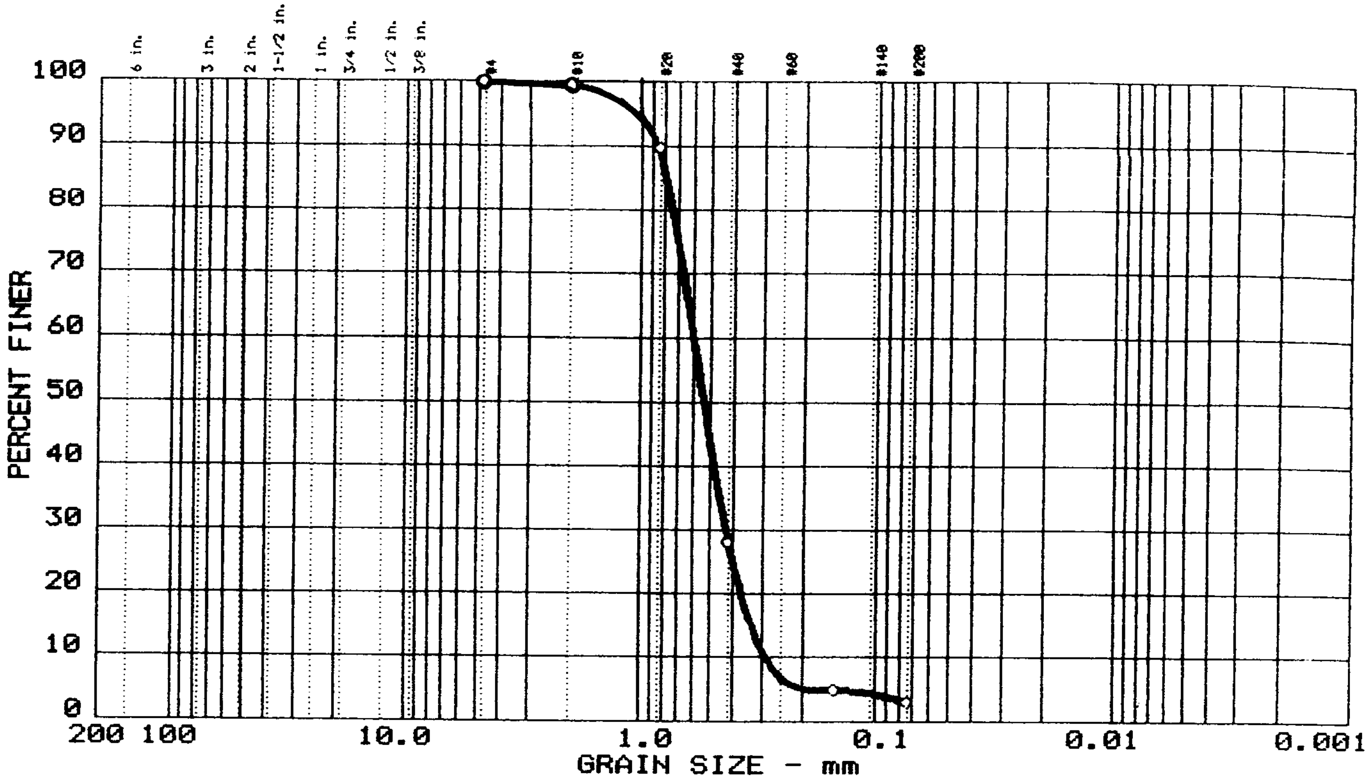
SAMPLE NO. 3

NAT. MOIST. 47%

SPEC. GRAV. 2.56

Fig. No. ______

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	96.9	3.1	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o			0.78	0.59	0.54	0.430	0.3334	0.2904	1.07	2.0

MATERIAL DESCRIPTION	USCS	AASHTO
o SAND ,TRACE SILT,BROWN	SP	A-1-b

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R

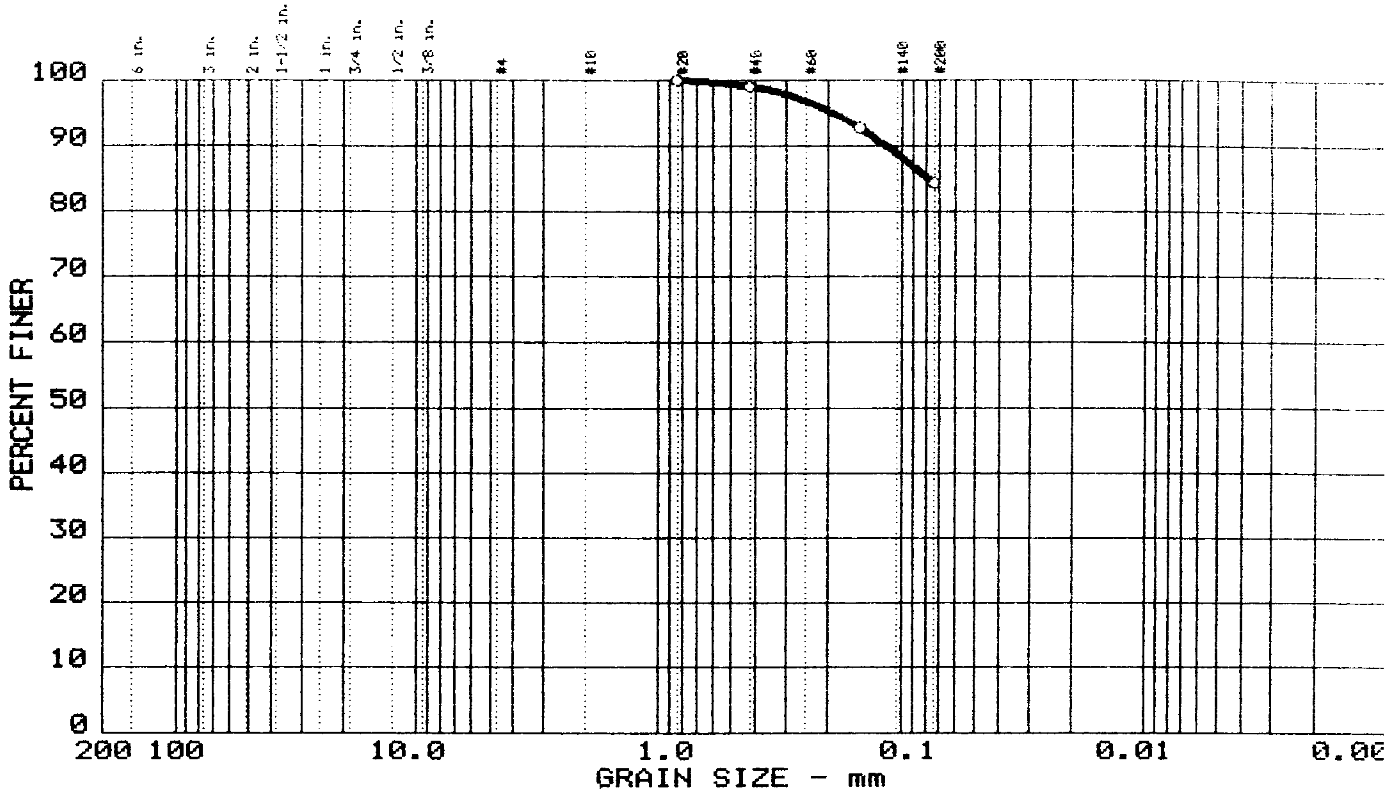
Date: 02-06-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR: C-B-D-C-7
SAMPLE: 8
NAT.MOST.23%

Figure No.______

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	15.7	84.3	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	41	14	0.08							

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILT, CLAYEY, LITTLE SAND, BROWN	ML	A-7-6(13)

Project No.:
Project: RIO ARECIBO PROJECT
○ Location: ARECIBO P.R.

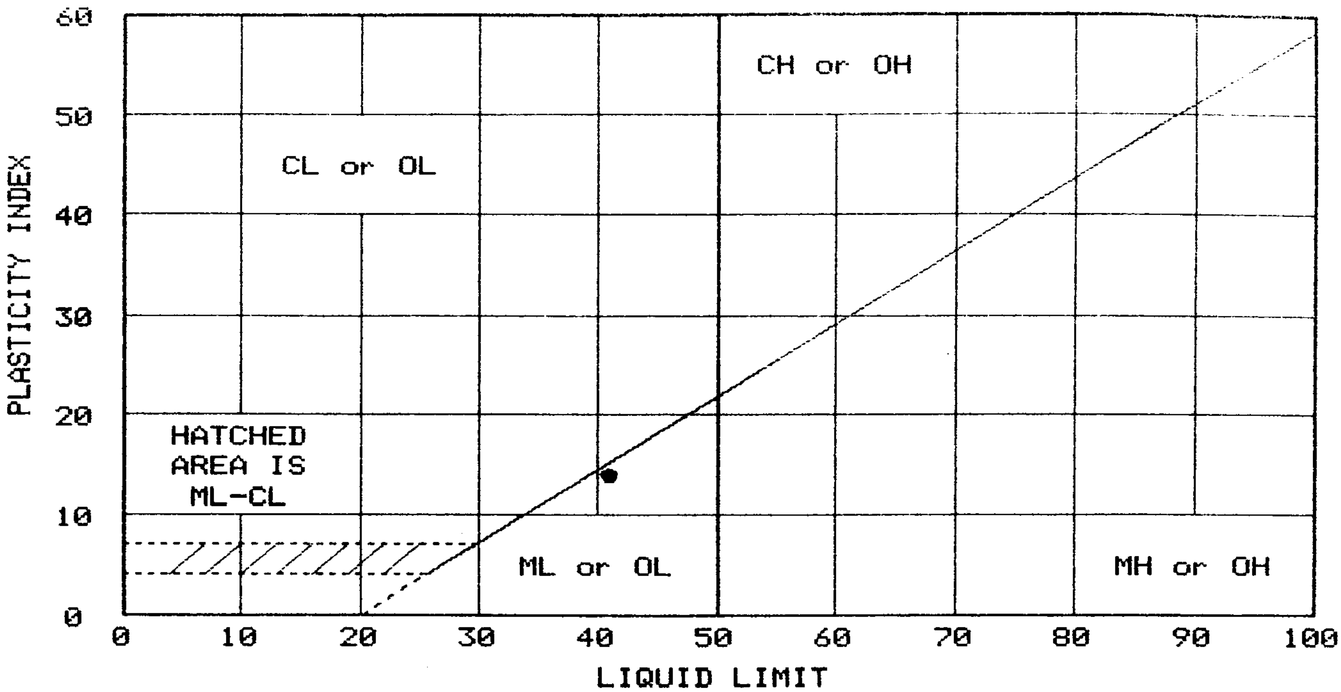
Date: 02-07-96

Remarks:
BOR. C-B-D-C-8
SAMPLE: 3
NAT.MOST. 34%

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	USCS	AASHTO
● SILT, CLAYEY, LITTLE SAND, BROWN	41	27	14	84.3	ML	A-7-6(13)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

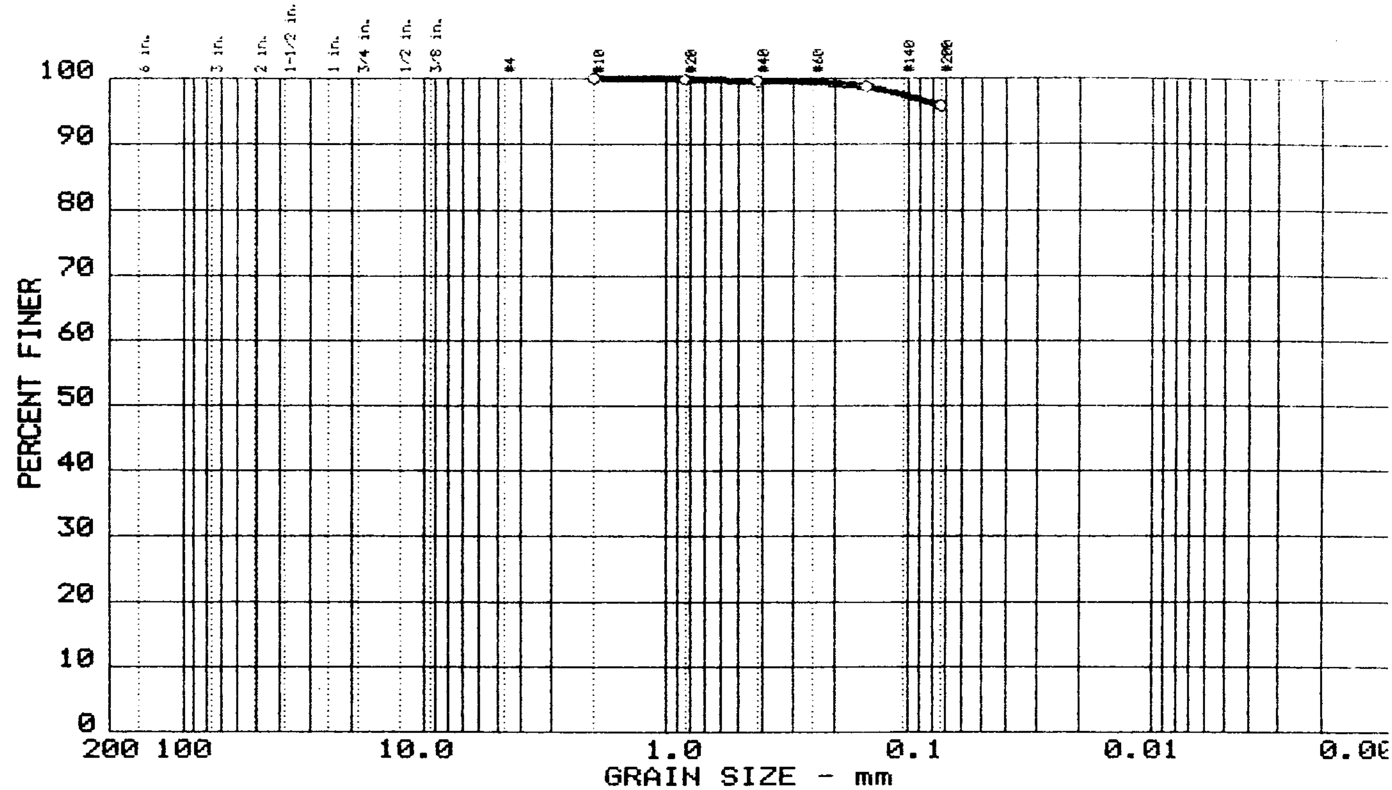
Date: 02-07-96

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-D-C-8
SAMPLE: 3
NAT.MOST. 34%

Fig. No.______

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	4.2	95.8	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	60	26								

	MATERIAL DESCRIPTION	USCS	AASHTO
o	SILT : CLAYEY , TRACE FINE SAND, DARK BROWN	MH	A-7-5(31)

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R.

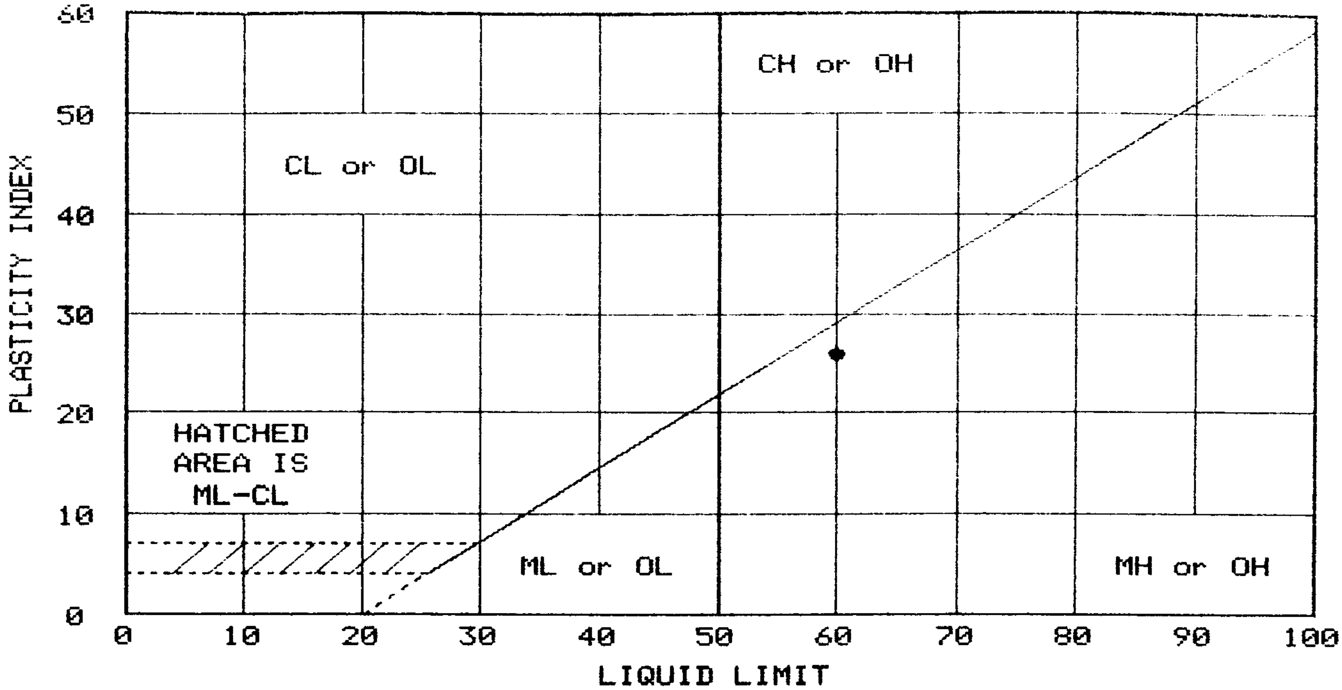
Date: 02-07-96

Remarks:
BOR. C-B-D-C-9
SAMPLE: 6
NAT. MOST. 46%
SEPC.GRAV. 2.548

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	USCS	AASHTO
● SILT, CLAYEY, TRACE FINE SAND, DARK BROWN	60	34	26	95.8	MH	A-7-5(31)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

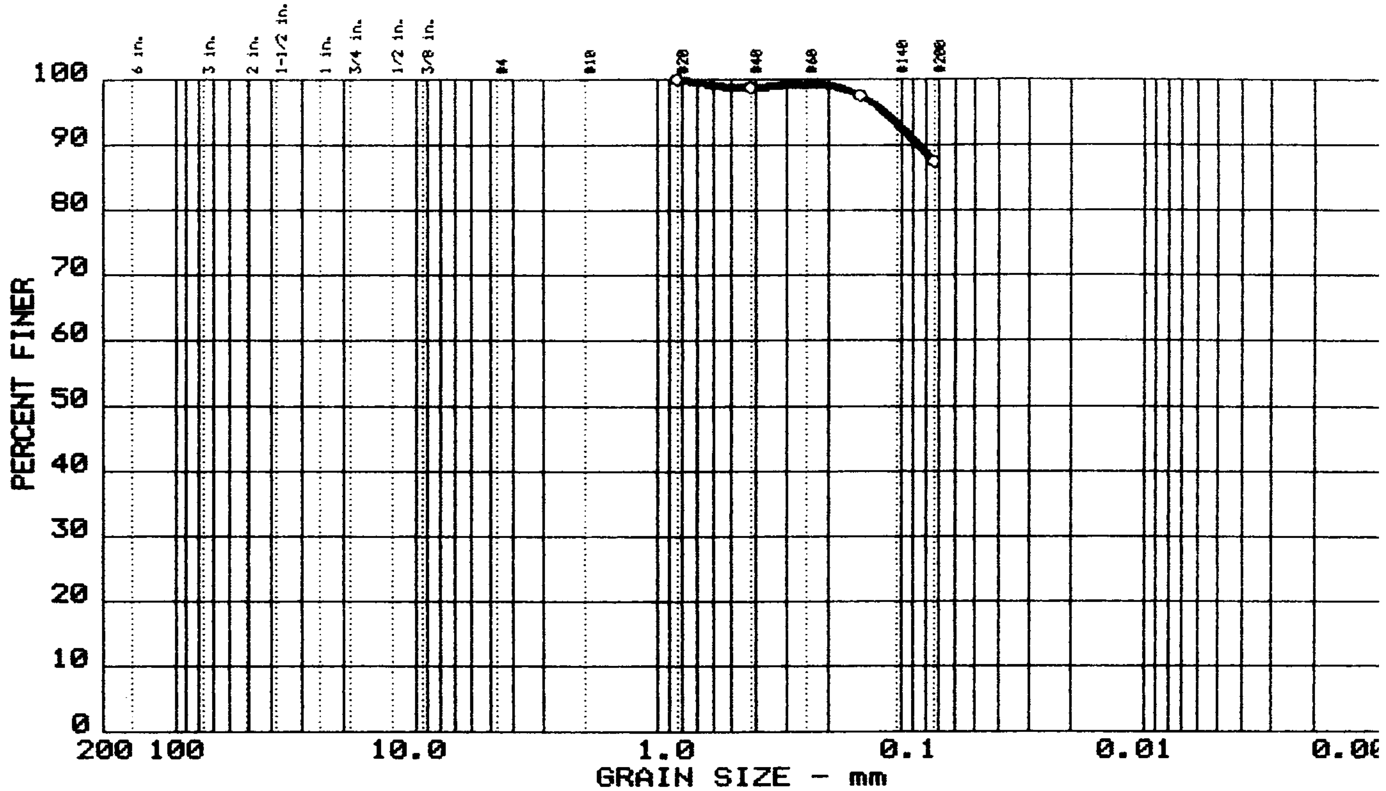
Date: 02-07-96

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-D-C-9
SAMPLE: 6
NAT.MOST. 46%
SEPC.GRAV. 2.548

Fig. No.______

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	12.5	87.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	42	19								

MATERIAL DESCRIPTION	USCS	AASHTO
o CLAY ,SILTY , LITTLE SAND , YELLOWISH BROWN	CL	A-7-6(18)

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R.

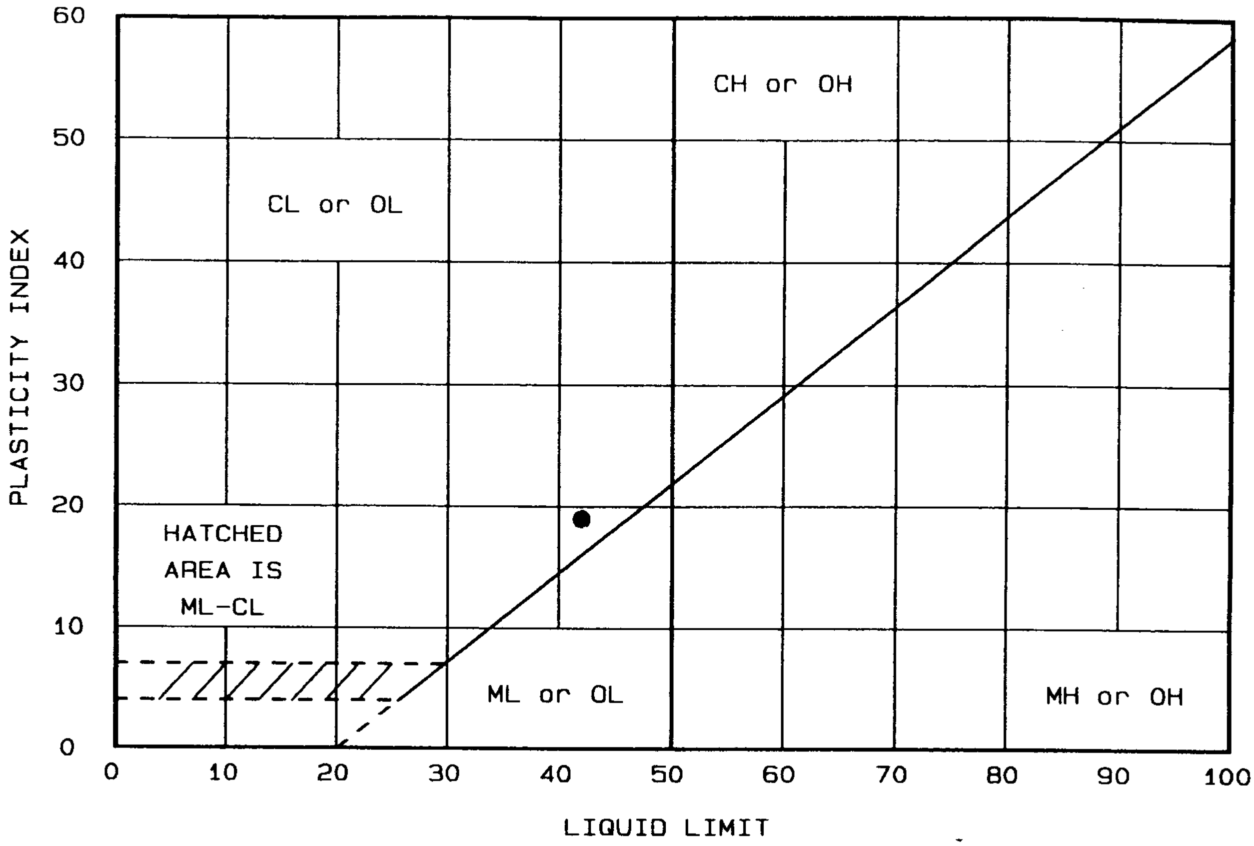
Date: 02-07-96

Remarks:
BOR. C-B-D-C-9
SAMPLE: 13
NAT.MOST.45%
SPEC. GRAV. 2.52

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	ASTM D 2487-90
● CLAY, SILTY, LITTLE SAND, YELLOWISH BROWN	42	23	19	87.5	CL, Lean clay

Project No.:
Project: RIO ARECIBO PROJECT

Client: USACE
Location: ARECIBO P.R.

Date: 2-7-96

LIQUID AND PLASTIC LIMITS TEST REPORT

SUELOS INC.

Remarks:

BOR. C-B-D-C-9

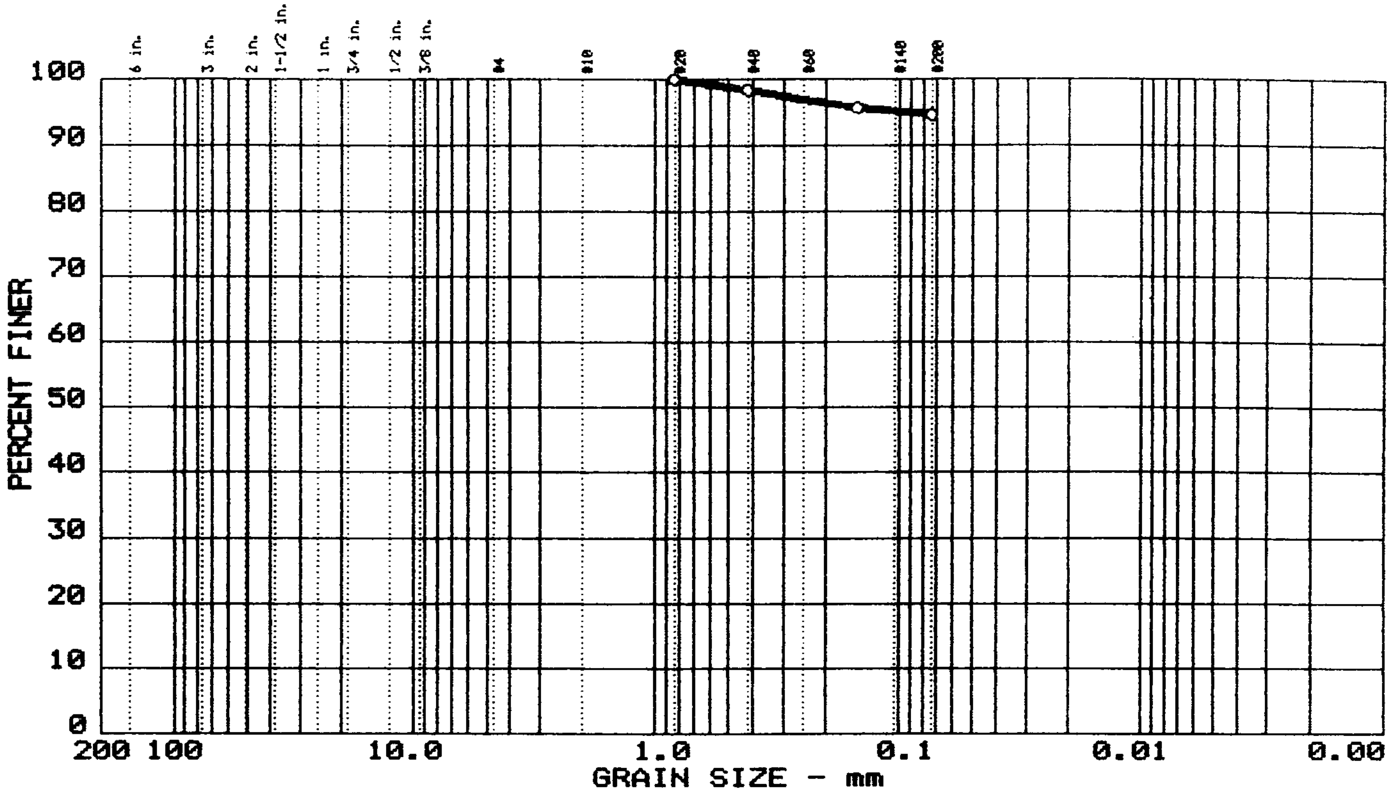
SAMPLE NO. 13

NAT. MOIST. 45%

SPEC. GRAV. 2.52

Fig. No. 2

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	5.4	94.6	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	37	11								

MATERIAL DESCRIPTION	USCS	AASHTO
o SILT ,CLAYEY , TRACE SAND , OLIVE GRAY	ML	A-6(12)

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R.

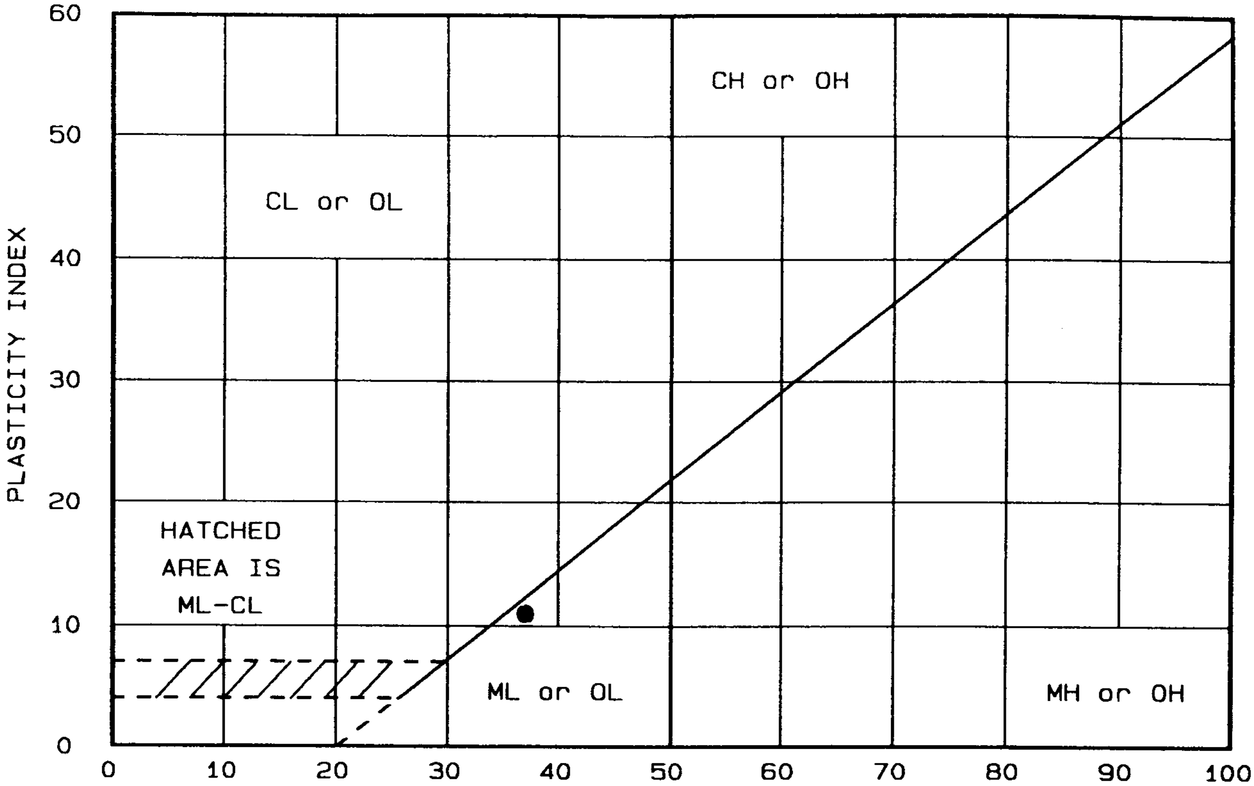
Date: 02-07-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-D-C-9
SAMPLE: 17
NAT.MOST.39%

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	ASTM D 2487-90
● **SILT ,CLAYEY , TRACE SAND , OLIVE GRAY**	37	26	11	94.6	ML, Silt

Project No.:
Project: RIO ARECIBO PROJECT

Client: USACE
Location: ARECIBO P.R.

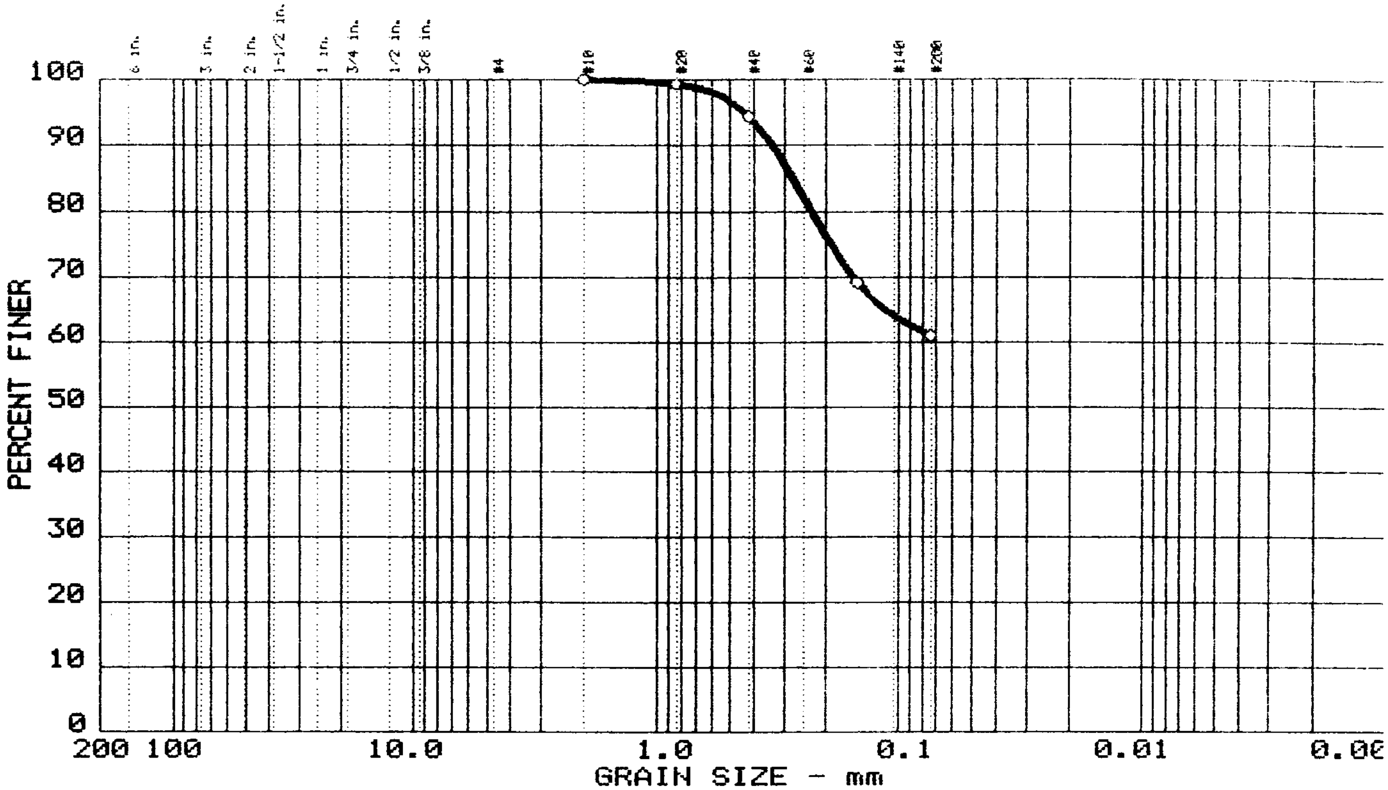
Date: 2-7-96

Remarks:
BOR. C-B-D-C-9
SAMPLE NO. 17
NAT. MOIST. 39%

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Fig. No. 2

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75 mm	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	38.9	61.1	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	35	12	0.28							

MATERIAL DESCRIPTION	USCS	AASHTO
○ CLAY ,SILTY , SANDY , OLIVE GRAY	CL	A-6(5)

Project No.:
Project: RIO ARECIBO PROJECT
○ Location: ARECIBO P.R.

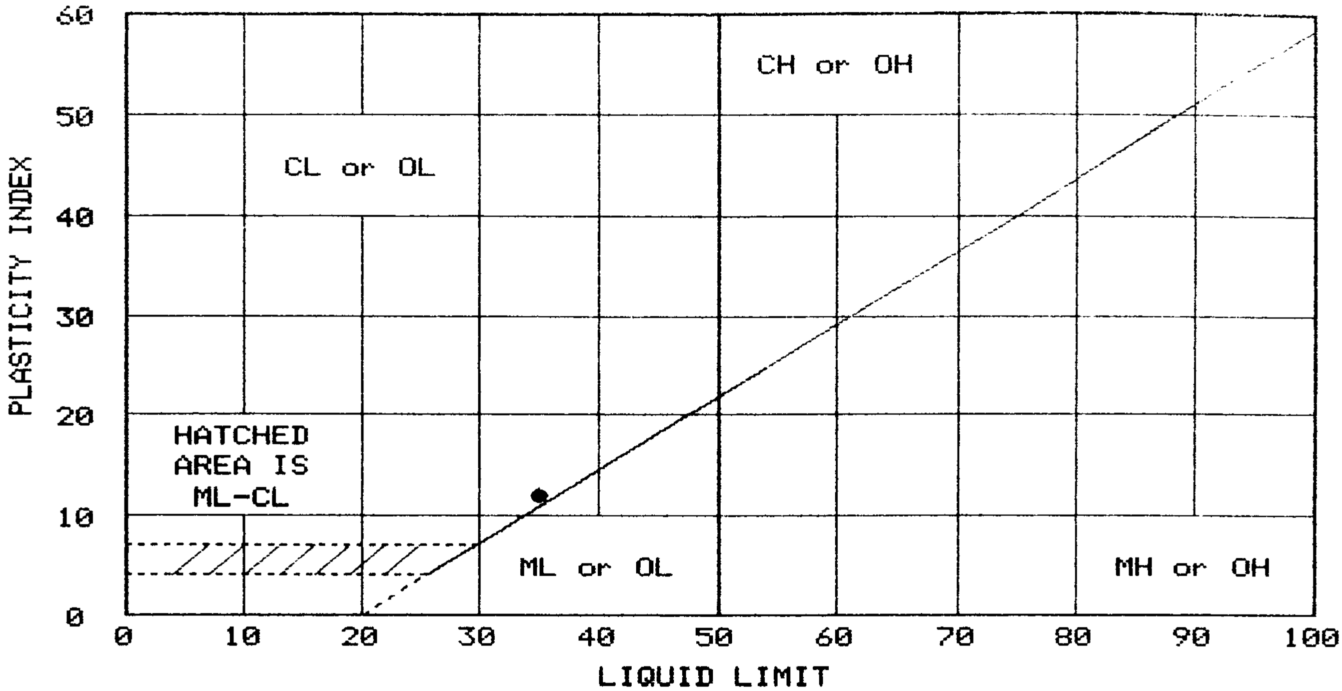
Date: 02-07-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-D-C-9
SAMPLE: 19
NAT.MOST.35%
SEPC.GRAV. 2.57

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	USCS	AASHTO
● CLAY ,SILTY , SANDY , OLIVE GRAY	35	23	12	61.1	CL	A-6(5)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

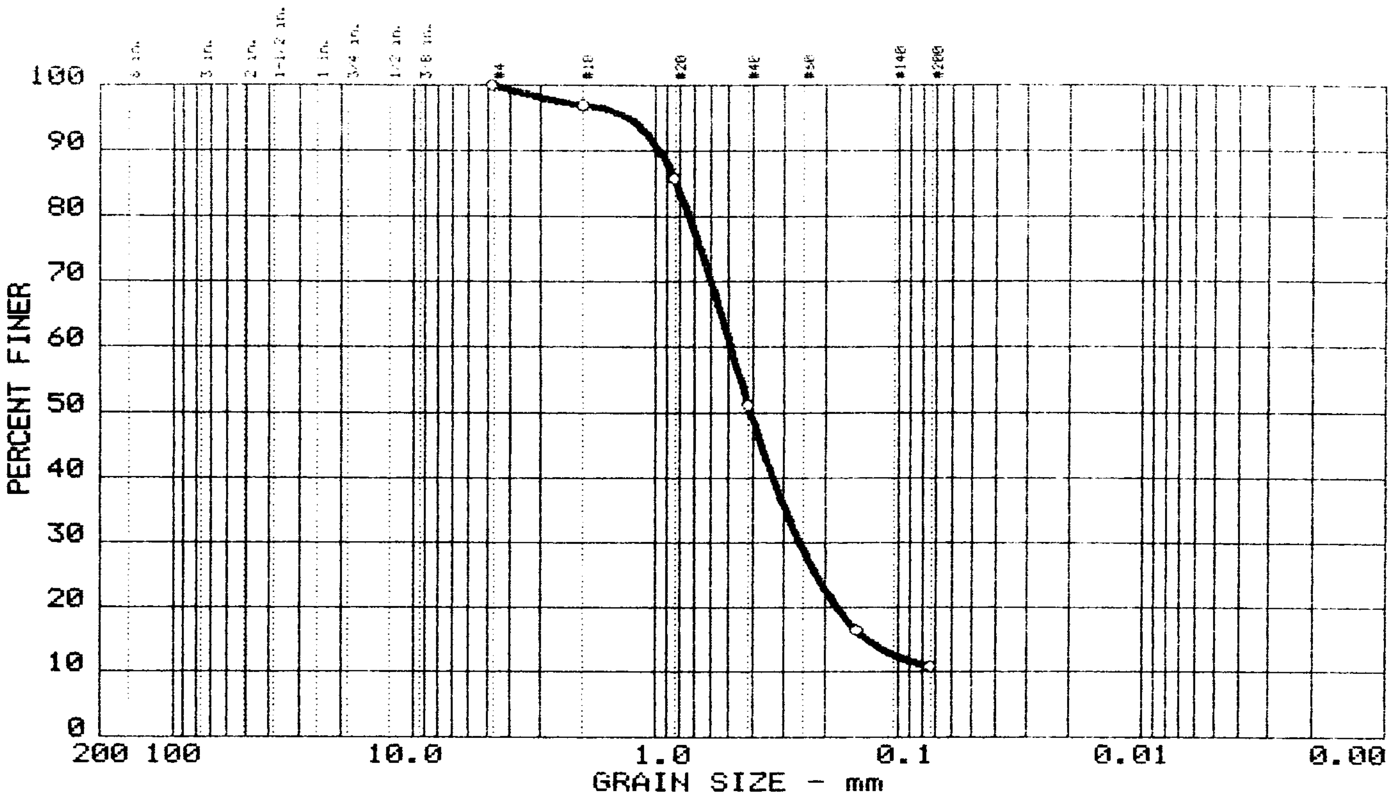
Date: 02-07-96

Remarks:
BOR. C-B-D-C-9
SAMPLE: 19
NAT.MOST. 35%
SEPC.GRAV. 2.57

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Fig. No._____

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	89.2	10.8	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.82	0.49	0.41	0.255	0.1340			

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND,LITTLE SILT,YELLOWISH BROWN	SP-SM	A-2-4(0.4)

Project No.:
Project: RIO ARECIBO PROJECT
○ Location: ARECIBO P.R.

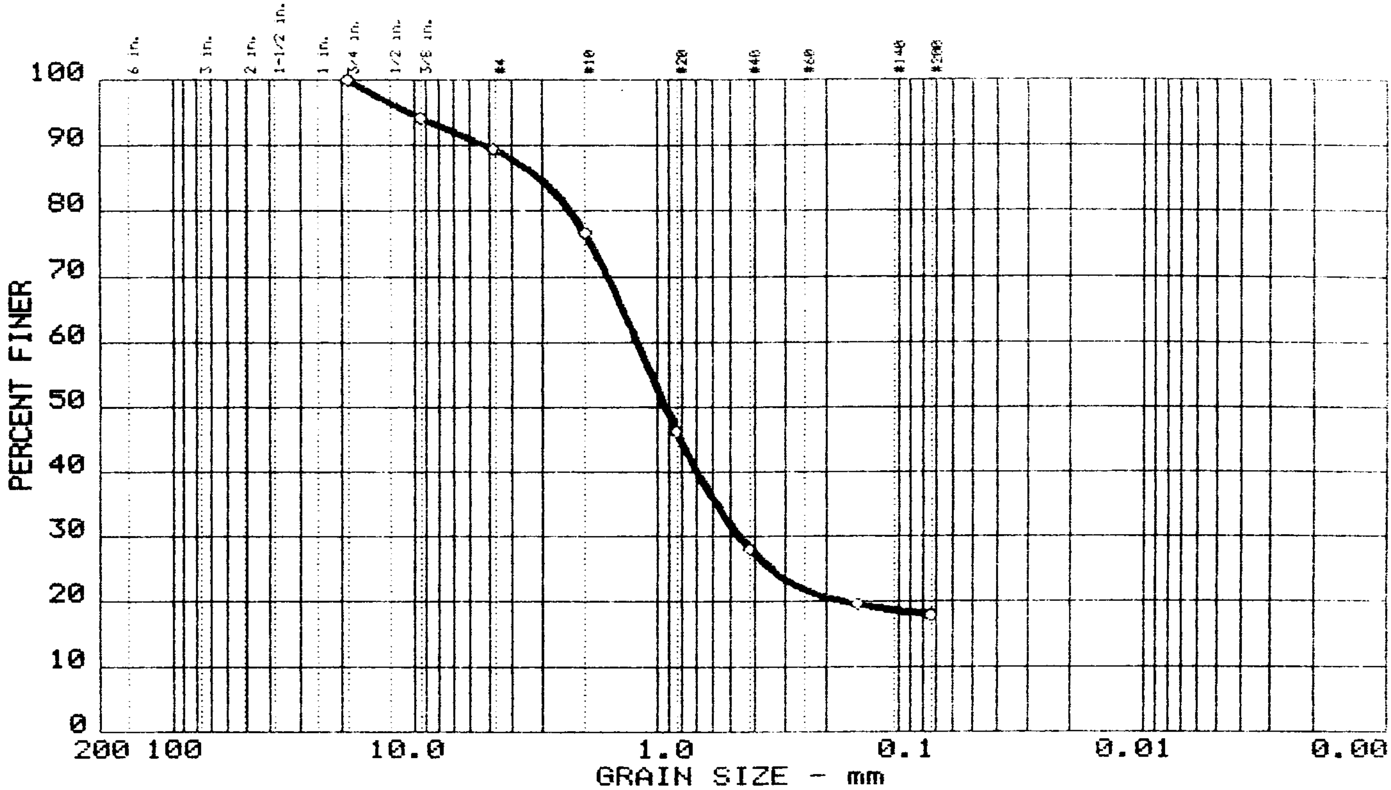
Date: 02-08-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-D-C-10
SAMPLE: 5
NAT.MOST.12%
SEPC.GRAV. 2.60

Figure No.______

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75 mm	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	10.6	71.4	18.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			3.05	1.22	0.93	0.462				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND, LITTLE SILT, YELLOWISH BROWN	SM	A-1-b

Project No.:
Project: RIO ARECIBO PROJECT
○ Location: ARECIBO P.R.

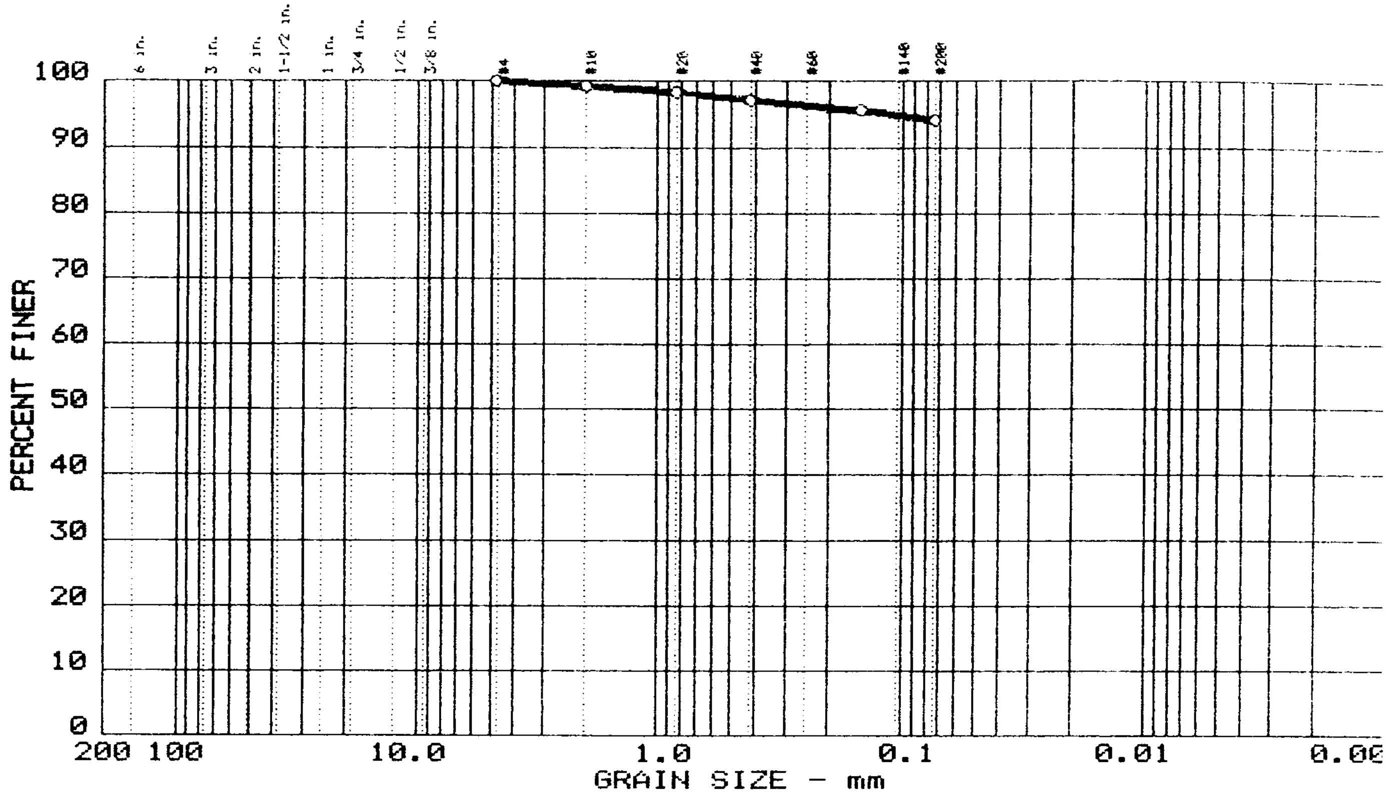
Date: 02-08-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR: C-B-D-C-10
SAMPLE: 9
NAT.MOST. 17%

Figure No.______

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	5.9	94.1	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	54	27								

MATERIAL DESCRIPTION	USCS	AASHTO
○ CLAY , SILTY , TRACE SAND , DARK BROWN	CH	A-7-6(29)

Project No.:
Project: RIO ARECIBO PROJECT
○ Location: ARECIBO P.R

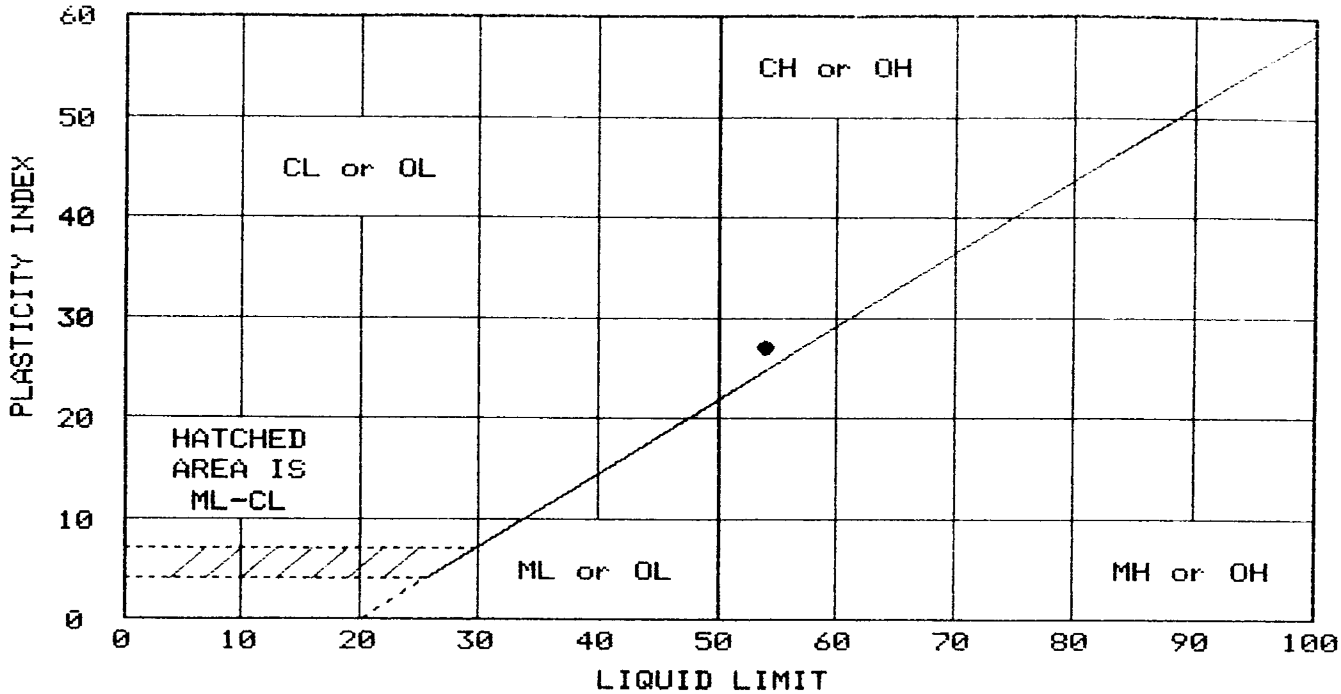
Date: 02-06-96

Remarks:
BOR: C-B-D-C-11
SAMPLE: 4
NAT.MOST.44%

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	USCS	AASHTO
● CLAY, SILTY, TRACE SAND, DARK BROWN	54	27	27	94.1	CH	A-7-6(29)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

Date: 02-05-96

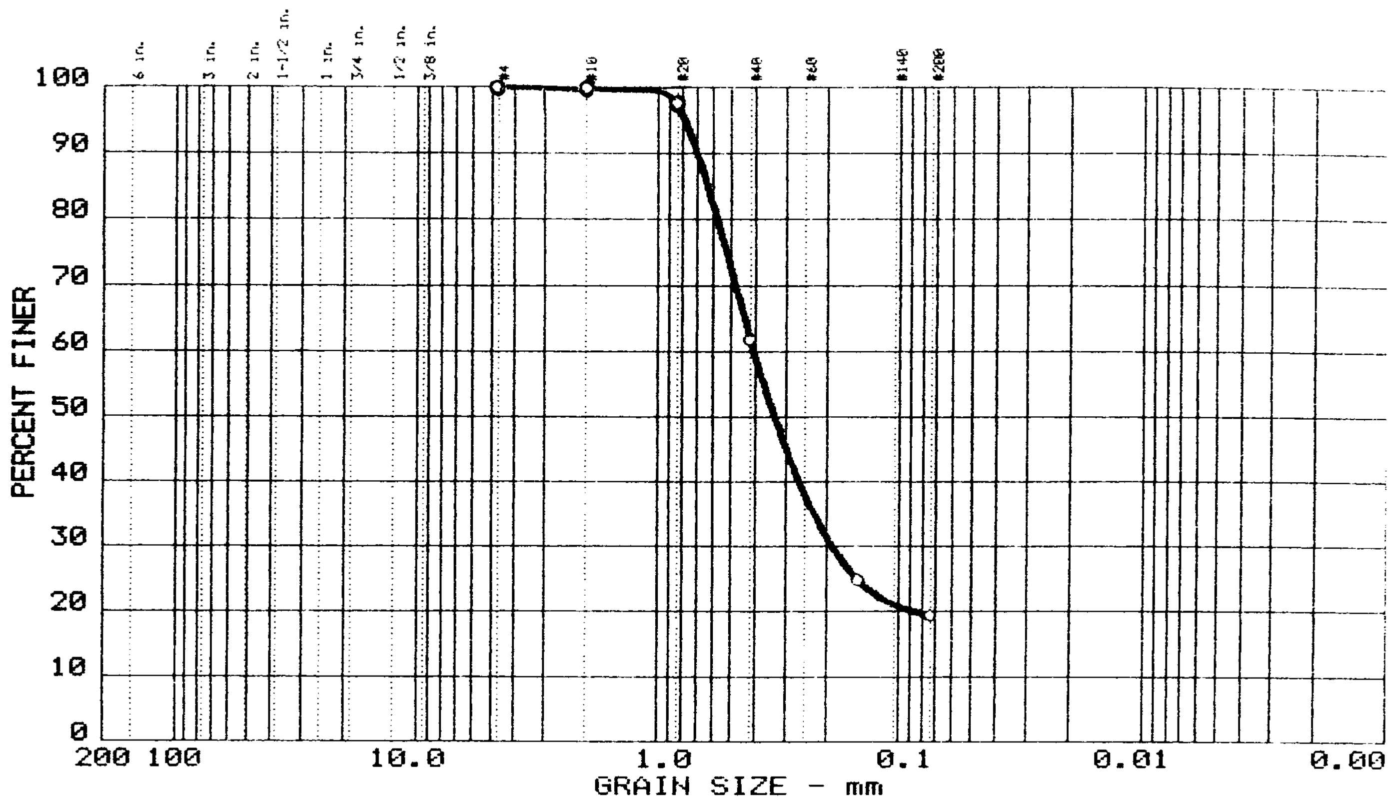
LIQUID AND PLASTIC LIMITS TEST REPORT

SUELOS INC.

Remarks:
BOR. C-B-D-C-11
SAMPLE: 4
NAT.MOST. 44%

Fig. No.______

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	80.6	19.4	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.63	0.41	0.33	0.189				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND , LITTLE SILT , YELLOWISH BROWN	SM	A-2-4

Project No.:
Project: RIO ARECIBO PROJECT
○ Location: ARECIBO P.R

Date: 02-06-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR: C-B-D-C-11
SAMPLE: 9
NAT.MOST.49%

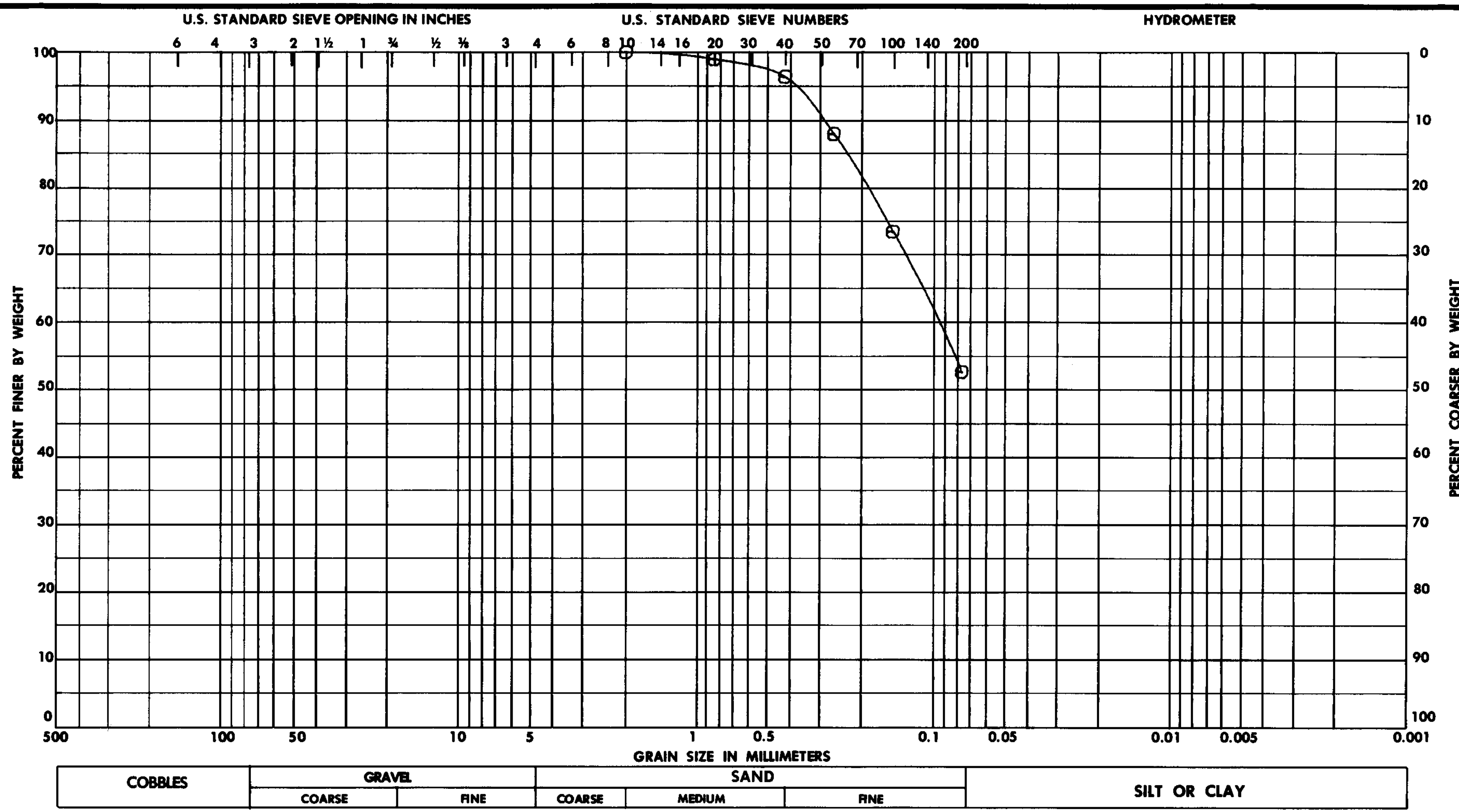
Figure No.______

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 5697

Req. No. RM-CW-88-0130

00320-106



Sample No.	~~Elev or~~ Depth	VISUAL Classification	Nat w %	LL	PL	PI
11	13.5-15.0'	LEAN CLAY (CL), GREENISH BROWN, SANDY, WITH A TRACE OF SHELL	--	--	--	--

Project RIO GRANDE DE ARECIBO, PR

Area LAB NO. 73/3279

Boring No. CB-RGA-1 .SAMPLE 11

Date 11/10/88

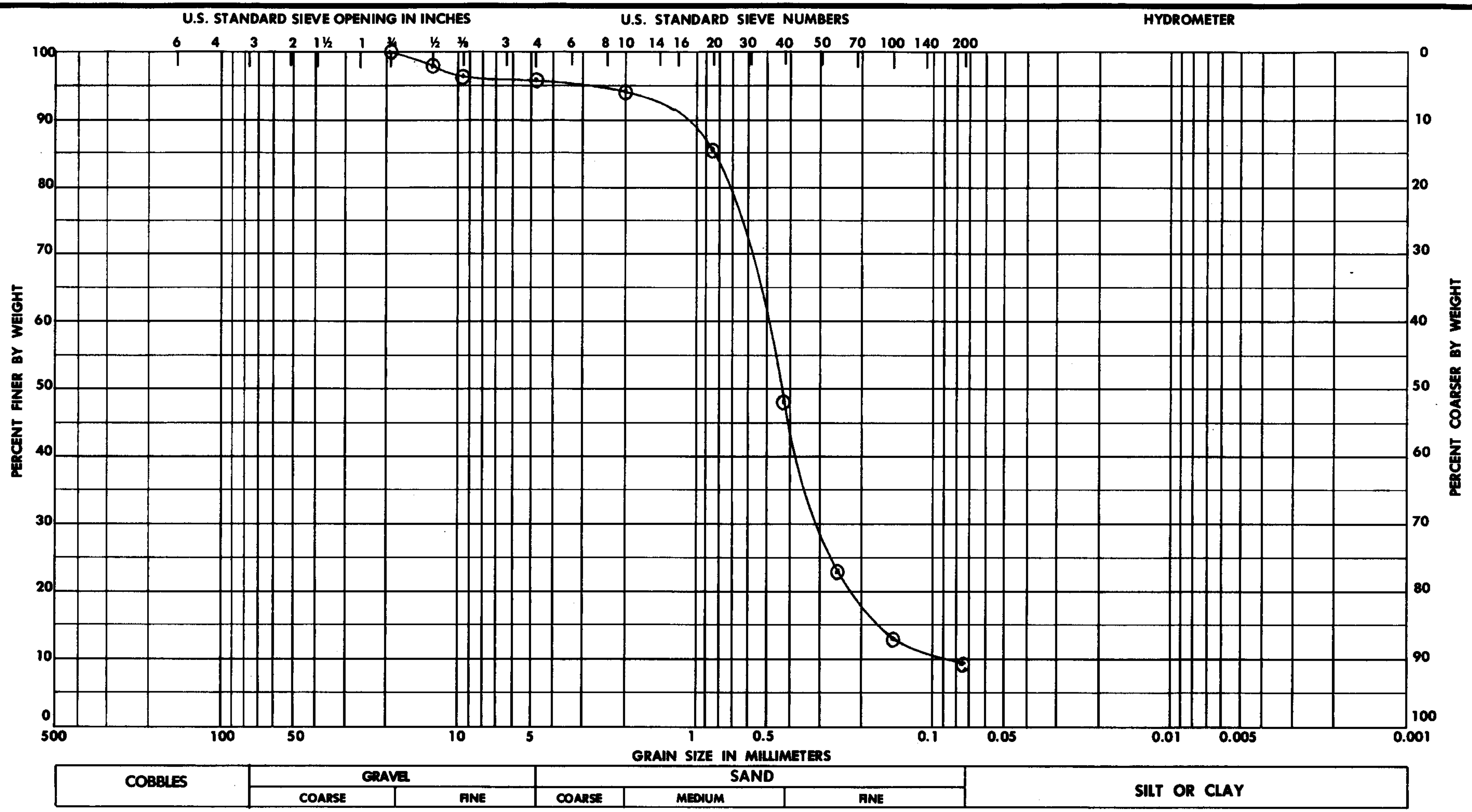
GRADATION CURVES

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 5697

Req. No. RM-CW-88-0130



Sample No.	~~Elev~~ Depth	visual Classification	Nat w %	LL	PL	PI
13	16.5-18.0'	Poorly grd silty sand (SP-SM) brown, with a trace of gravel size weathered rock fragments.	--	NP	NP	NP

Project RIO GRANDE DE ARECIBO,PR

Area LAB NO. 73/3280

Boring No. CB-RGA-1 ,SAMPLE NO. 13

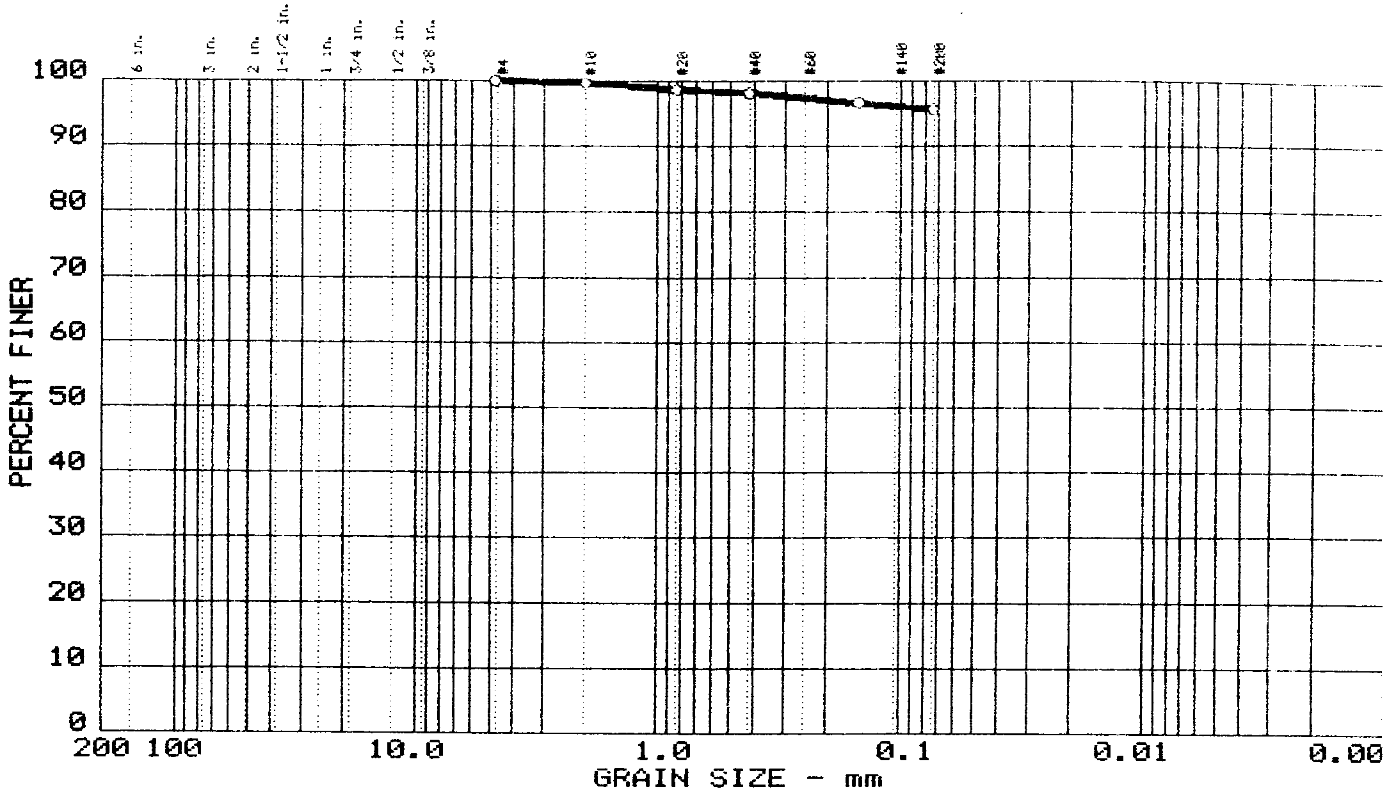
Date 11/10/88

GRADATION CURVES

ENG FORM 1 MAY 63 2087

00320-107

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	4.3	95.7	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	75	36								

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILT, CLAYEY, TRACE SAND, BROWN AND YELLOWISH BROWN	MH	A-7-5(44)

Project No.:
Project: RIO ARECIBO PROJECT
○ Location: ARECIBO P.R.

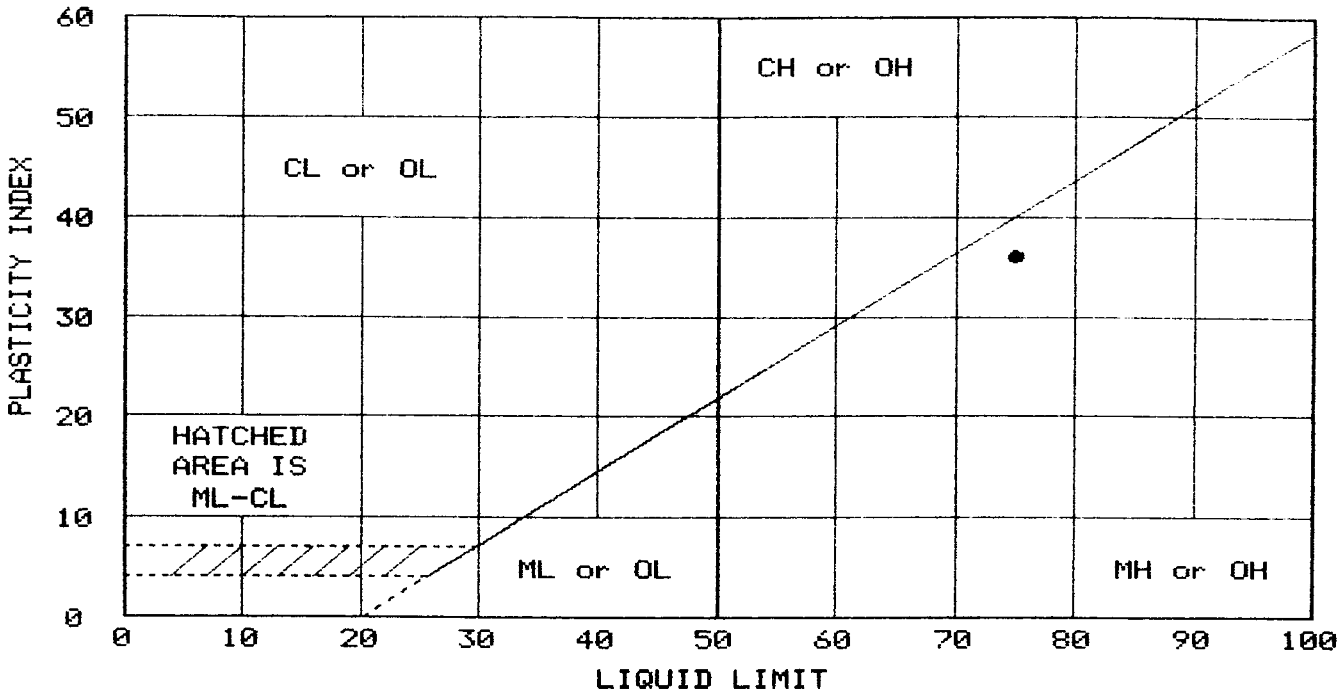
Date: 02-21-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-R-S-8
SAMPLE: 6
NAT.MOST. 44%

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	USCS	AASHTO
● SILT, CLAYEY, TRACE SAND, BROWN AND YELLOWISH BROWN	75	39	36	95.6	MH	A-7-5(44)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

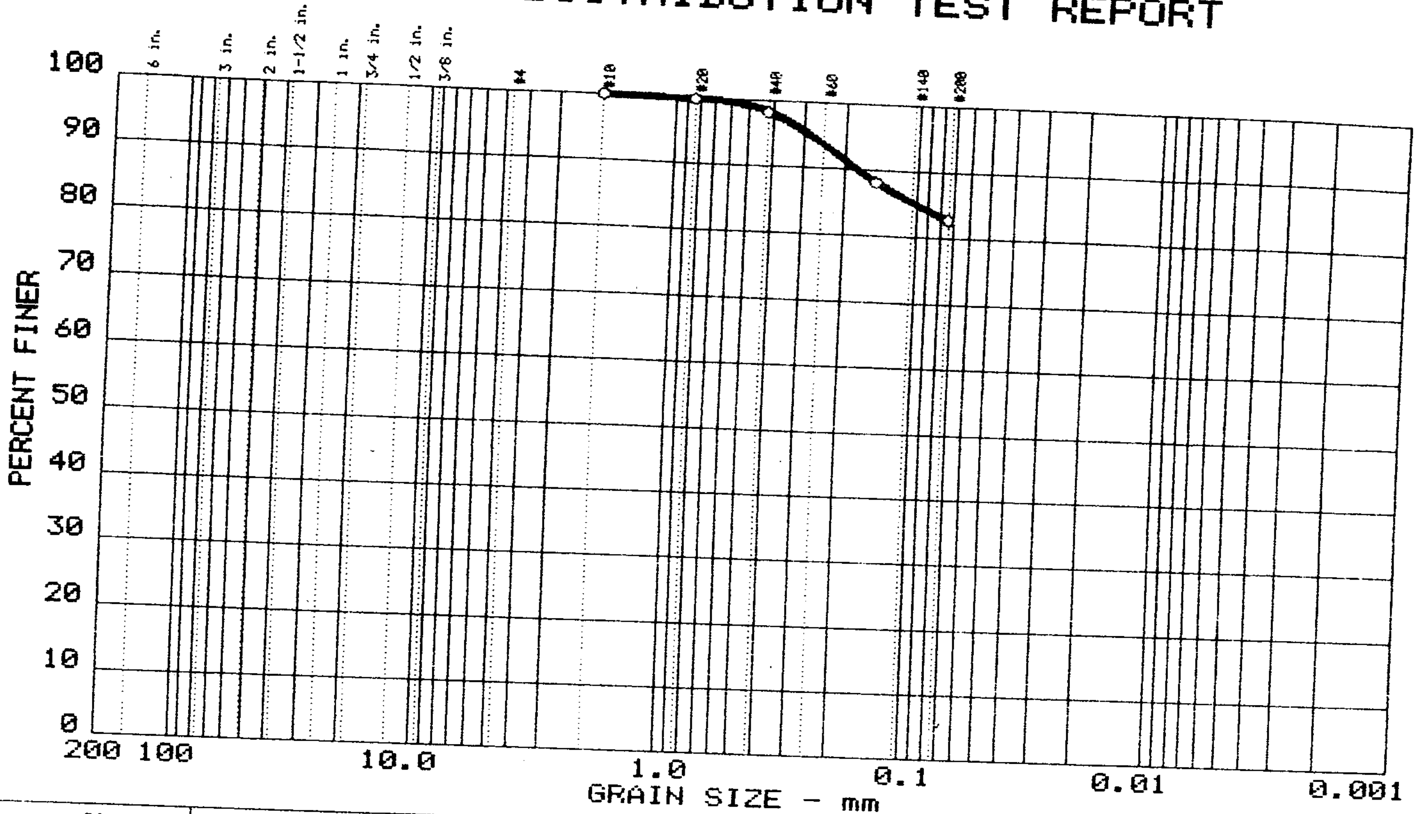
Date: 02-21-96

Remarks:
BOR. C-B-R-S-8
SAMPLE: 6
NAT.MOST. 44%

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Fig. No.______

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	17.3	82.7	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	55	23	0.10							

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILT,CLAYEY,TRACE SAND,DARK BROWN TO BROWN	MH	A-7-5(22)

Project No.:
Project: RIO ARECIBO PROJECT
○ Location: ARECIBO P.R.

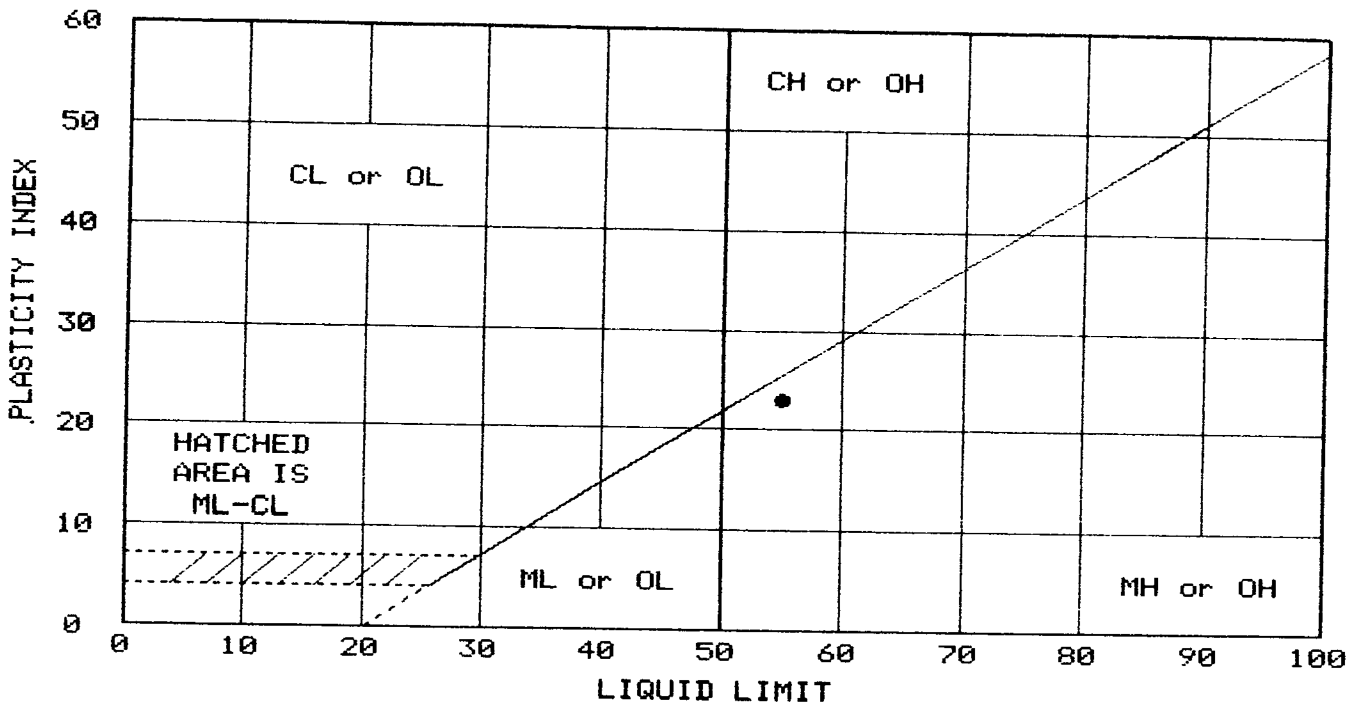
Date: 02-19-96

Remarks:
BOR. C-B-R-T-1
SAMPLE: 3
NAT.MOST. 26%
SPEC. GRAV. 2.52

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	USCS	AASHTO
●	SILT,CLAYEY.TRACE SAND, DARK BROWN TO BROWN	55	32	23	82.7	MH	A-7-5(22)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

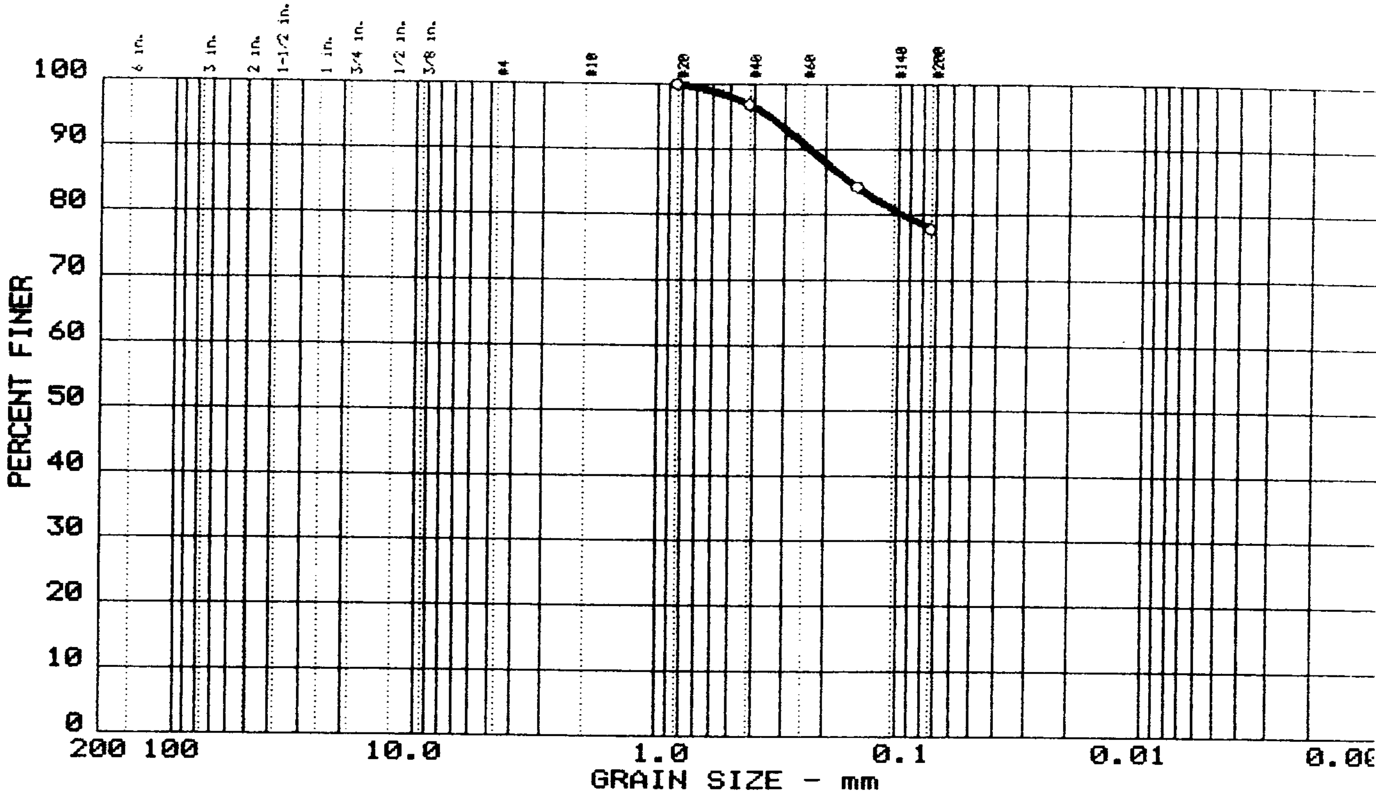
Date: 02-19-96

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-R-T-1
SAMPLE: 3
NAT.MOST. 26%
SPEC. GRAV. 2.52

Fig. No.______

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	22.2	77.8	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	44	19	0.16							

MATERIAL DESCRIPTION	USCS	AASHTO
○ CLAY, SILTY, SOME SAND, BROWN	CL	A-7-6(16)

Project No.:
Project: RIO ARECIBO PROJECT
○ Location: ARECIBO P.R.

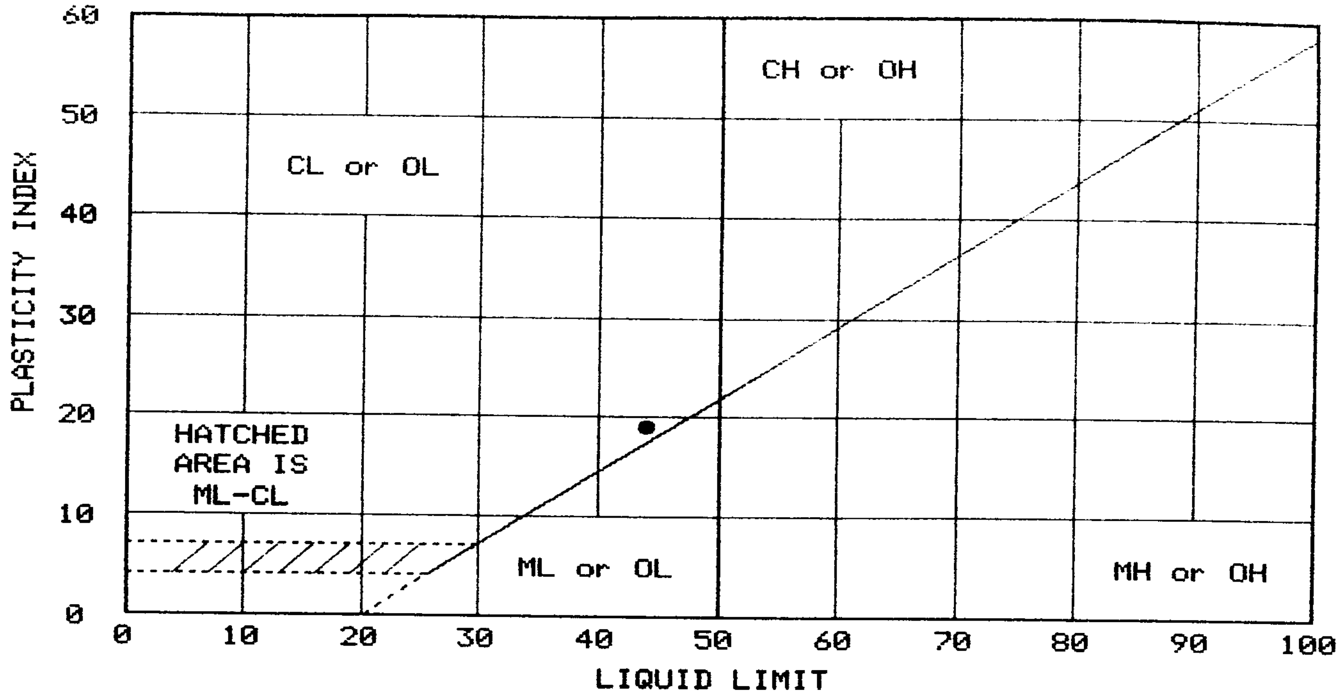
Date: 02-07-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-R-T-3
SAMPLE: 5
NAT.MOST.33%
SEPC.GRAV. 2.68

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	USCS	AASHTO
●	CLAY, SILTY, SOME SAND, BROWN	44	25	19	77.9	CL	A-7-6(16)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

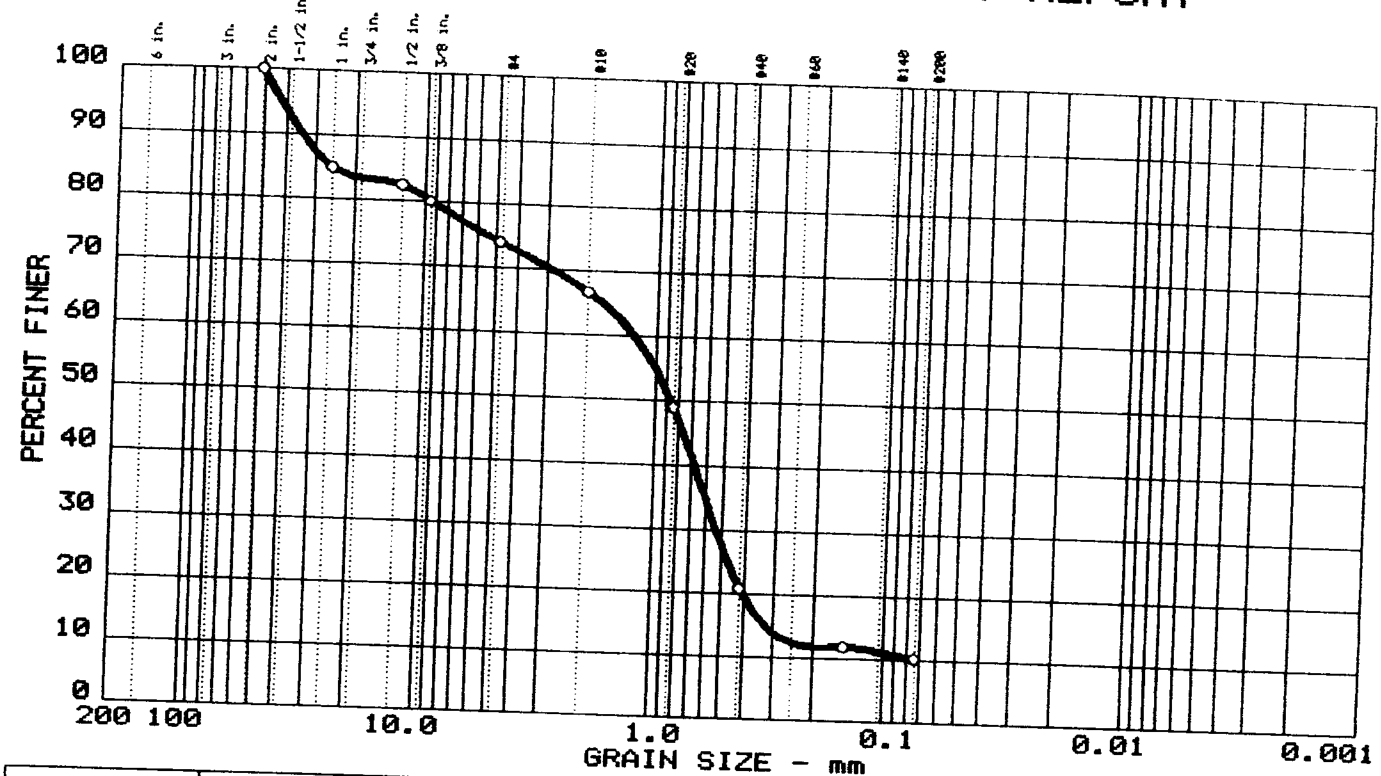
Date: 02-07-96

Remarks:
BOR. C-B-R-T-3
SAMPLE: 5
NAT.MOST. 33%
SEPC.GRAV. 2.68

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Fig. No.______

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	26.0	63.8	10.2	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o			25.12	1.24	0.86	0.536	0.3228			

MATERIAL DESCRIPTION	USCS	AASHTO
o SAND, SOME GRAVEL, LITTLE SILT, BROWN	SP-SM	A-1-b

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R.

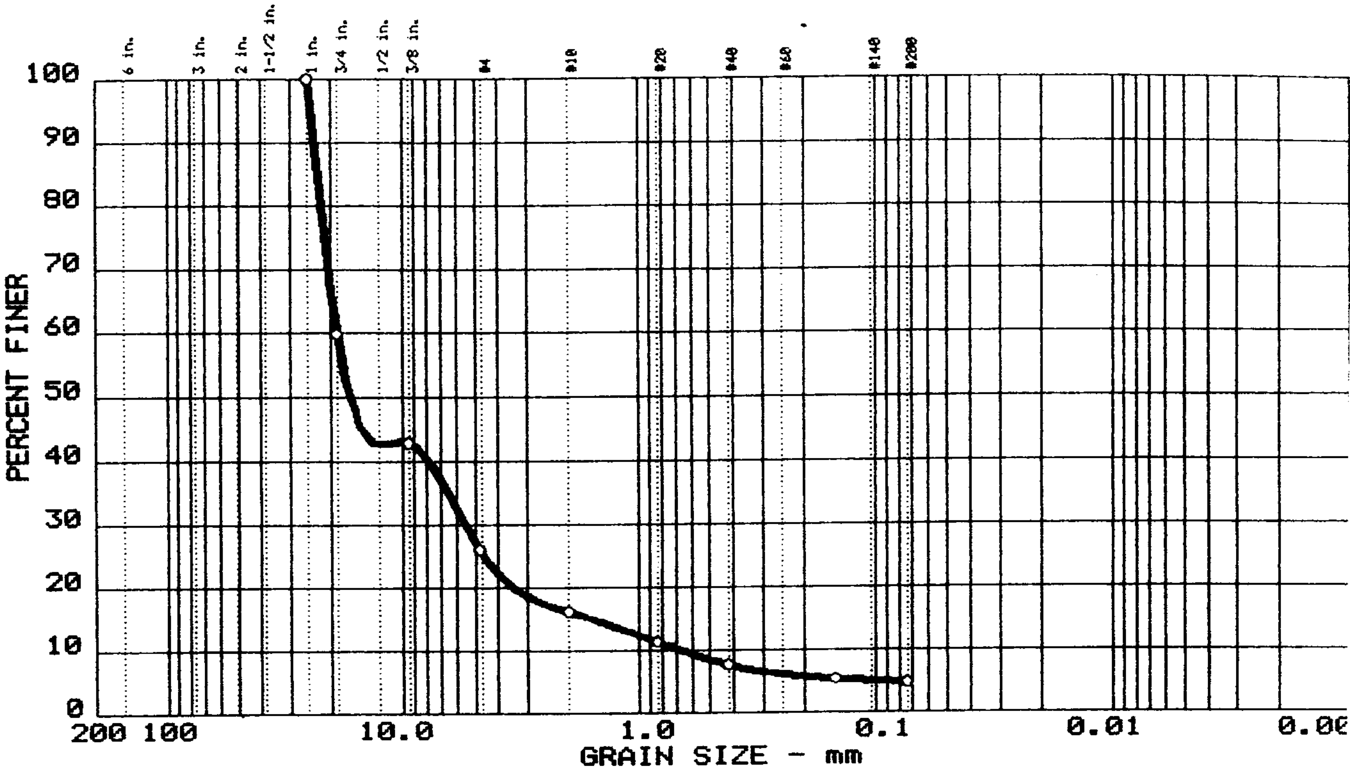
Date: 02-07-96

Remarks:
BOR. C-B-R-T-4
SAMPLE: 5
NAT.MOST. 3%

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Figure No.______

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	73.9	21.2	4.9	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o			23.07	19.05	16.84	5.449	1.5716	0.6552	2.38	29.1

MATERIAL DESCRIPTION	USCS	AASHTO
o GRAVEL, SOME SAND, TRACE SILT, GRAYISH BROWN	GW	A-1-a

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R.

Date: 02-07-96

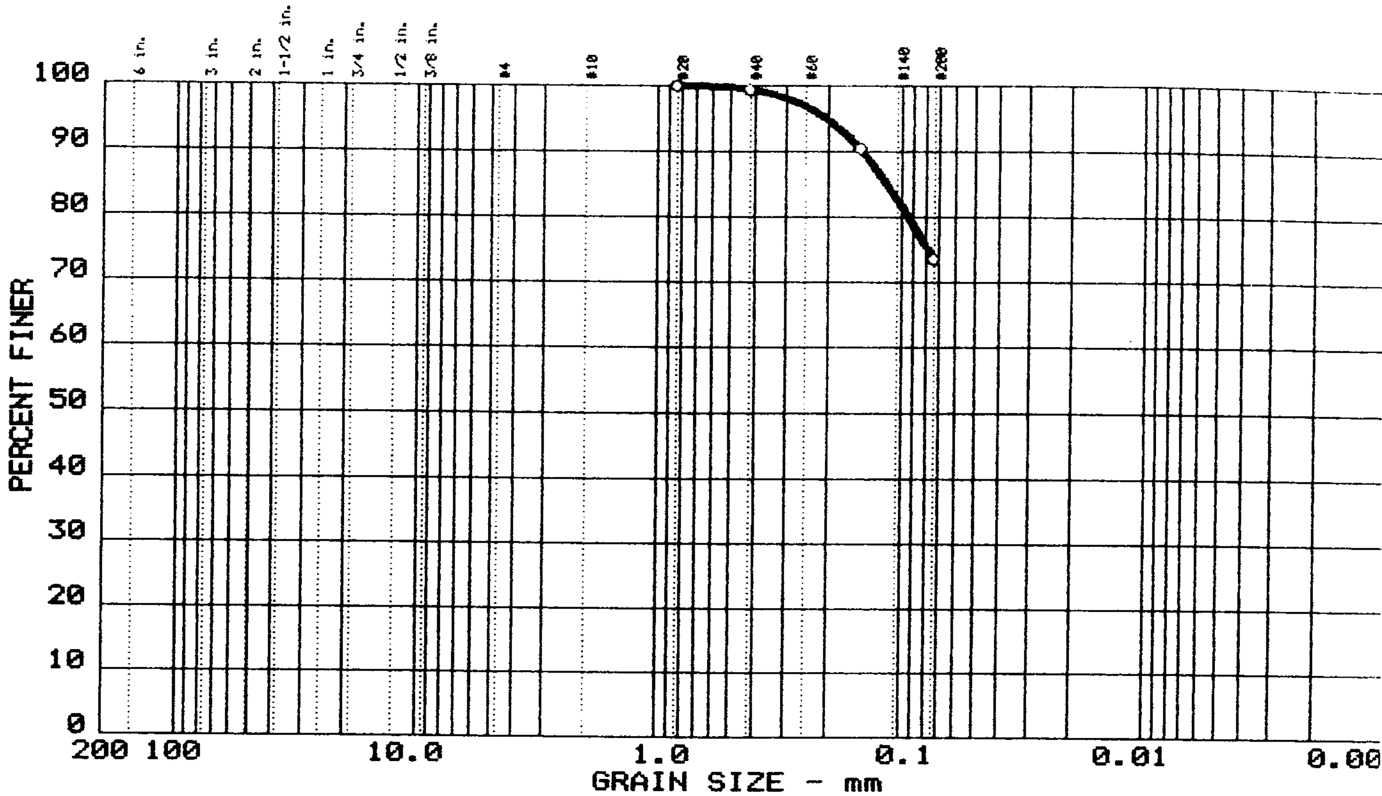
Remarks:
BOR. C-B-R-T-4
SAMPLE: 10
NAT.MOST.13%

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Figure No.______

... 725-2227 / Fax (809) 722-0107

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	26.5	73.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	48	21	0.11							

MATERIAL DESCRIPTION	USCS	AASHTO
o CLAY, SILTY, SOME FINE SAND, OLIVE AND LIGHT GRAY	CL	A-7-6(16)

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R.

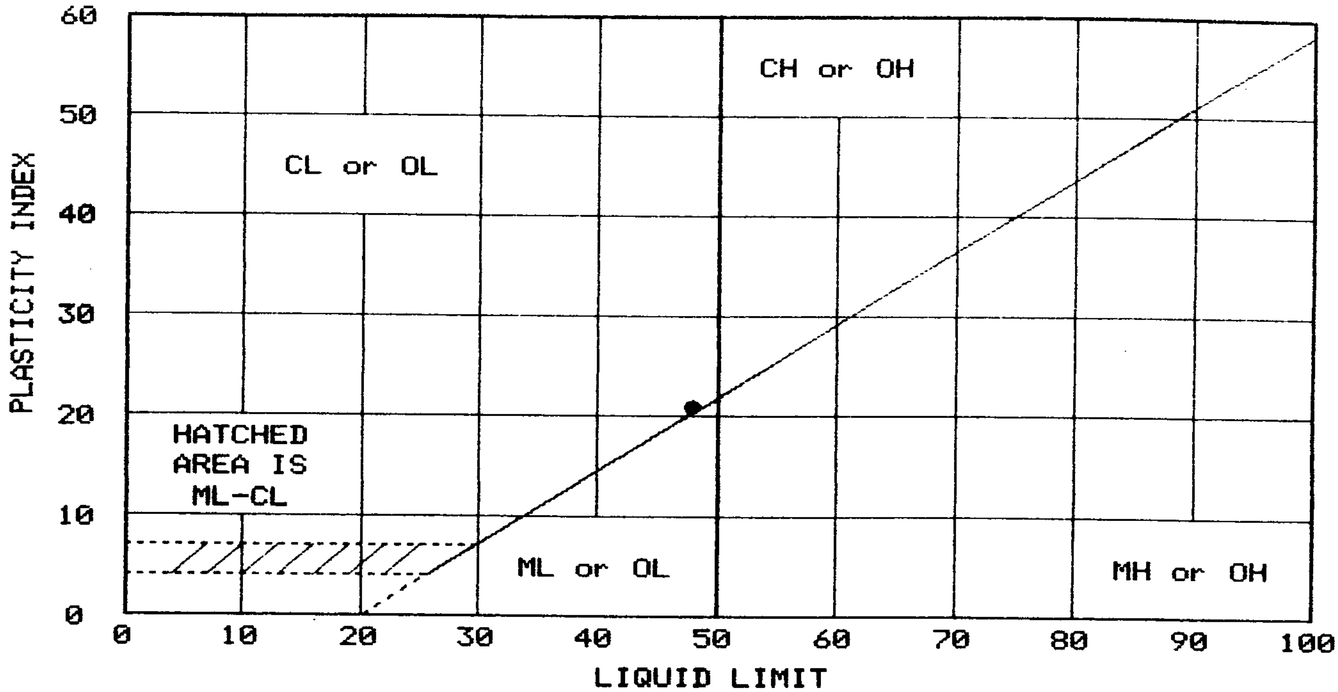
Date: 02-07-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-R-T-4
SAMPLE: 18
NAT.MOST.51%

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	USCS	AASHTO
● CLAY, SILTY, SOME FINE SAND, OLIVE AND LIGHT GRAY	48	27	21	73.5	CL	A-7-6(16)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

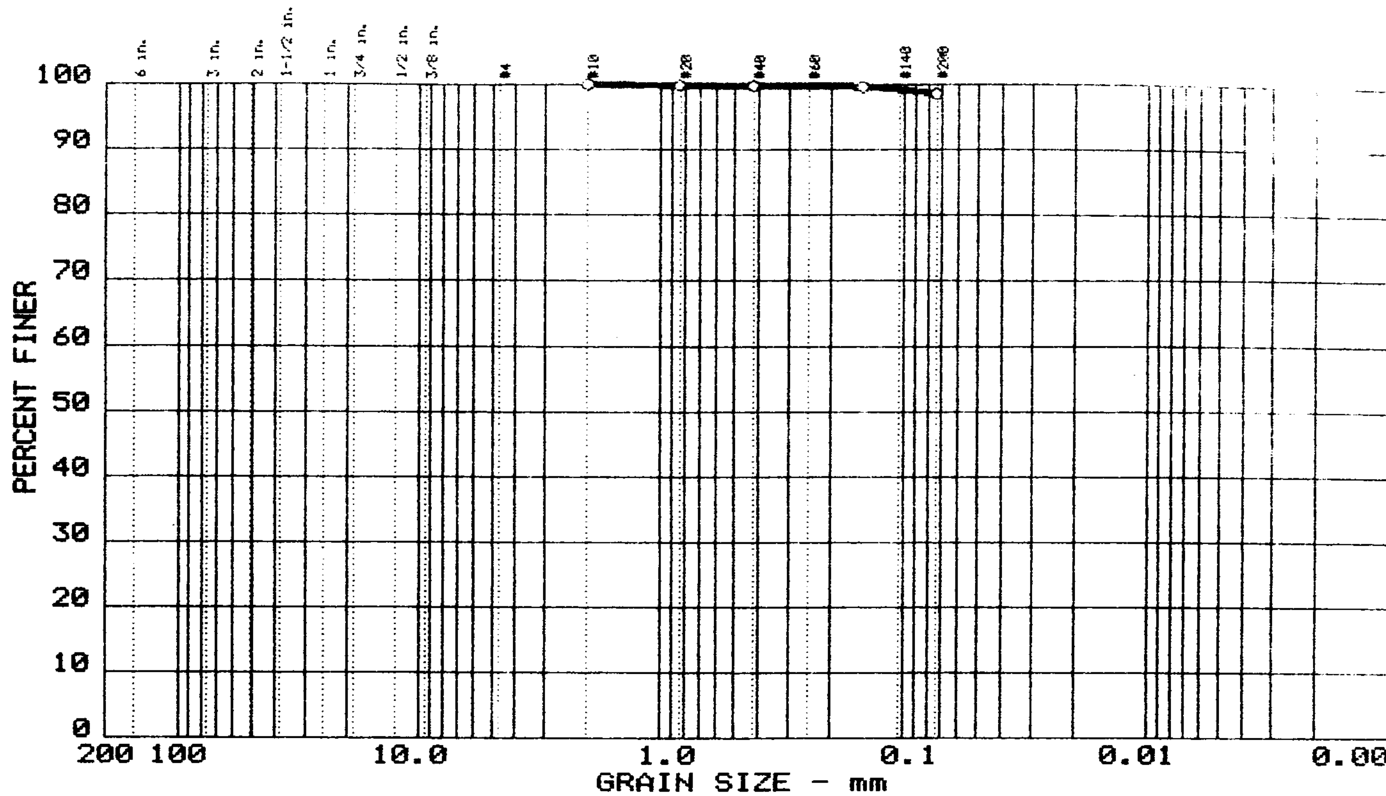
Date: 02-07-96

Remarks:
BOR. C-B-R-T-4
SAMPLE: 18
NAT.MOST. 51%

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Fig. No.______

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	1.4	98.6	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	46	20								

MATERIAL DESCRIPTION	USCS	AASHTO
○ CLAY, SILTY, TRACE SAND, DARK BROWN	CL	A-7-6(23)

Project No.:
Project: RIO ARECIBO PROJECT
○ Location: ARECIBO P.R.

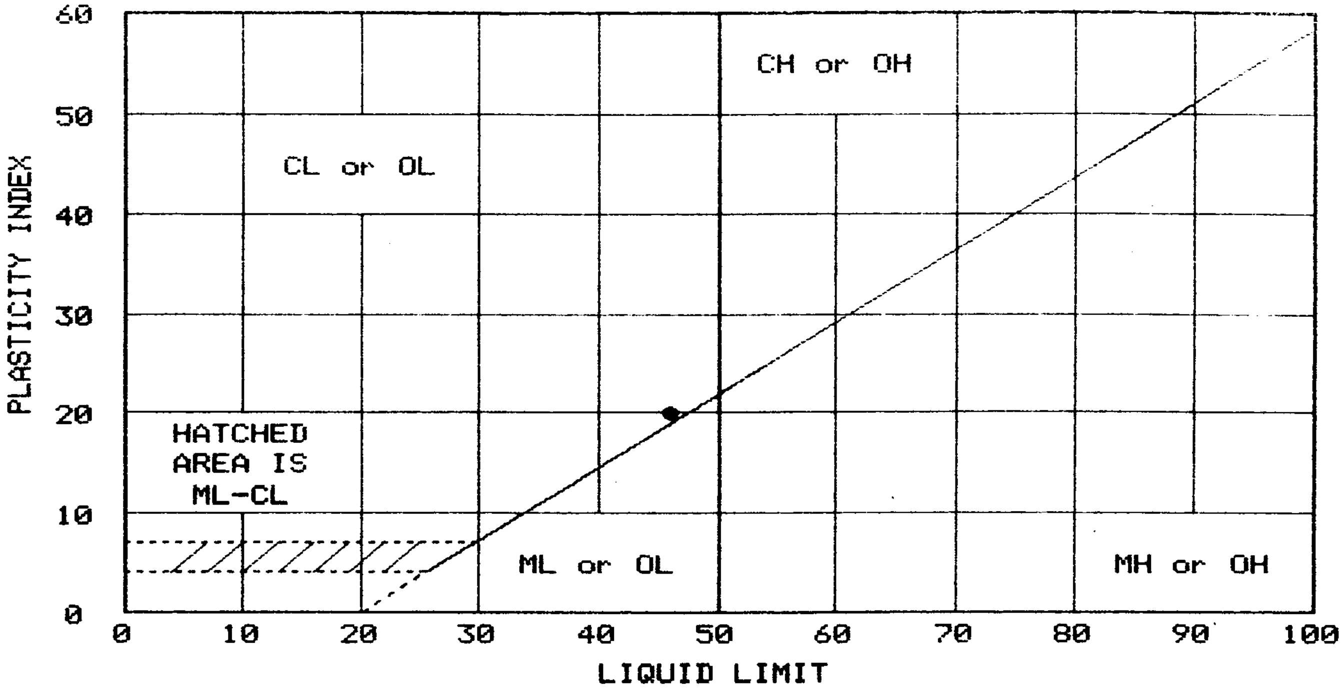
Date: 02-12-96

Remarks:
BOR. C-B-R-T-5
SAMPLE: 4
NAT.MOST. 44%
SPEC. GRAV. 2.55

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	USCS	AASHTO
● CLAY, SILTY, TRACE SAND, DARK BROWN	46	26	20	98.6	CL	A-7-6(23)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

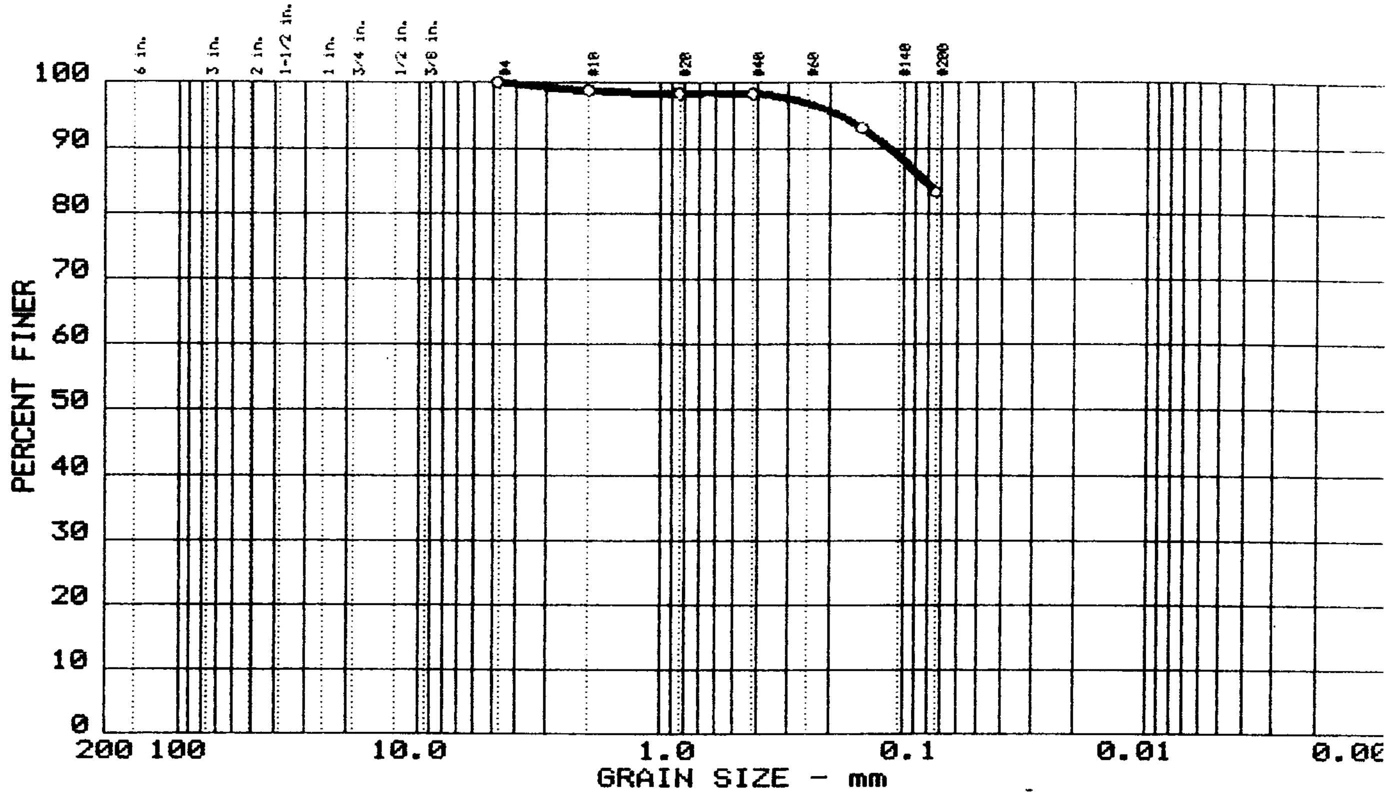
Date: 02-12-96

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-R-T-5
SAMPLE: 4
NAT.MOST. 44%
SPEC. GRAV. 2.55

Fig. No.______

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	16.5	83.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	52	25	0.08							

MATERIAL DESCRIPTION	USCS	AASHTO
o CLAY, SILTY, LITTLE SAND, DARK BROWN	CH	A-7-6 (23)

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R.

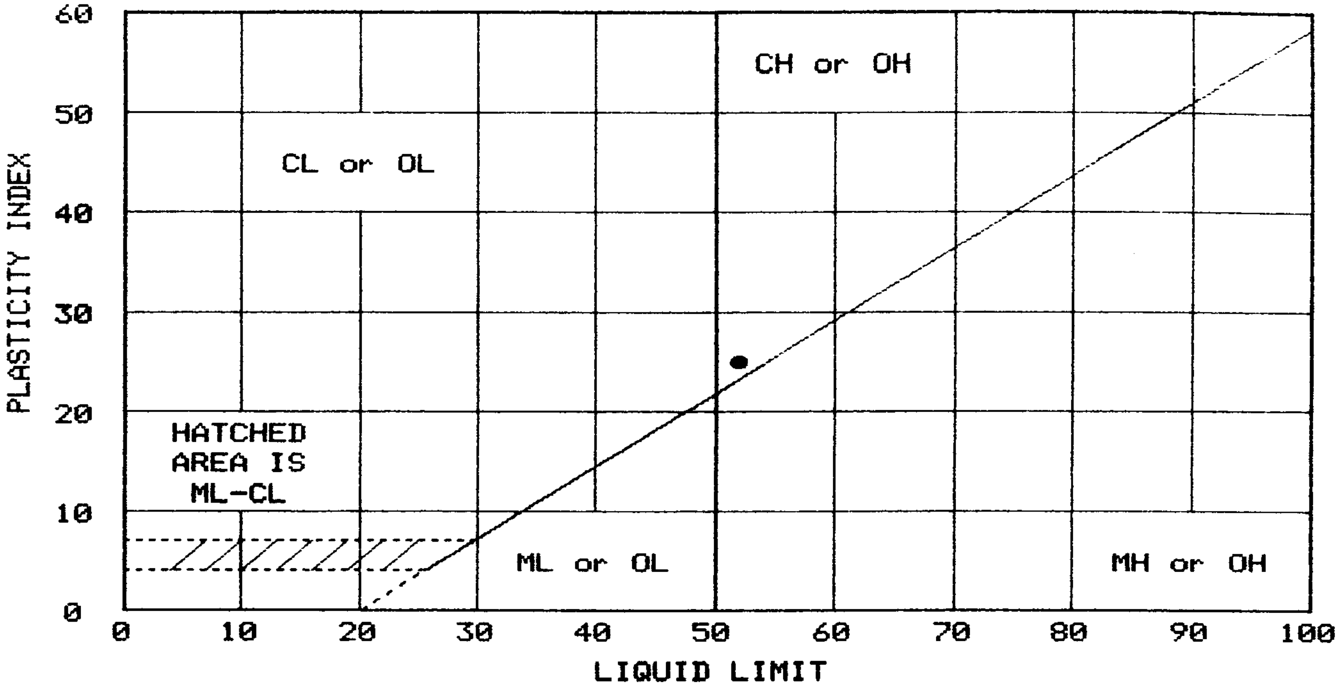
Date: 02-12-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-R-T-5
SAMPLE: 6
NAT.MOST. 25%

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	USCS	AASHTO
● CLAY, SILTY, LITTLE SAND, DARK BROWN	52	27	25	83.5	CH	A-7-6(23)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

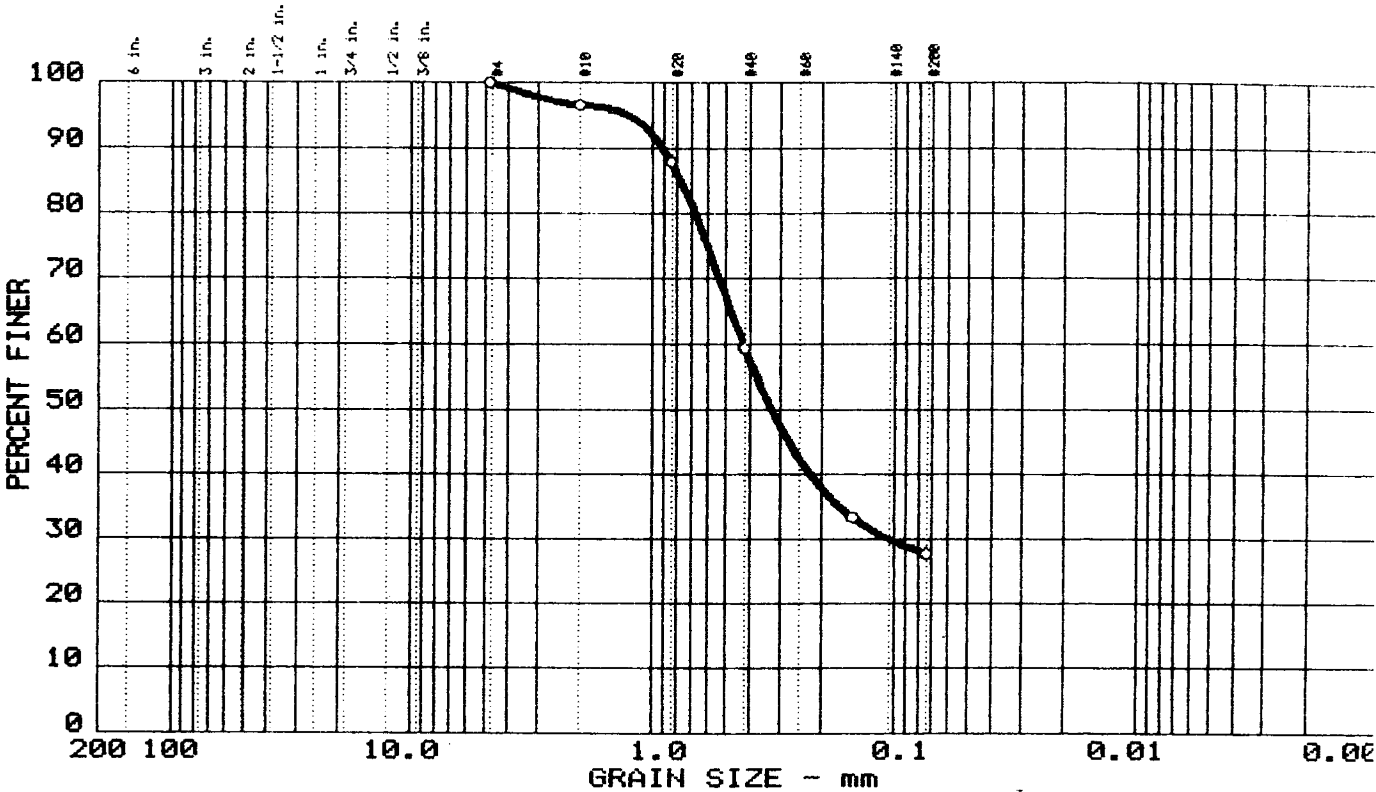
Date: 02-12-96

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-R-T-5
SAMPLE: 6
NAT.MOST. 25%

Fig. No.

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	72.2	27.8	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	29	9	0.76	0.42	0.32	0.105				

MATERIAL DESCRIPTION	USCS	AASHTO
o SAND, CLAYEY, BROWN	SC	A-2-4

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R.

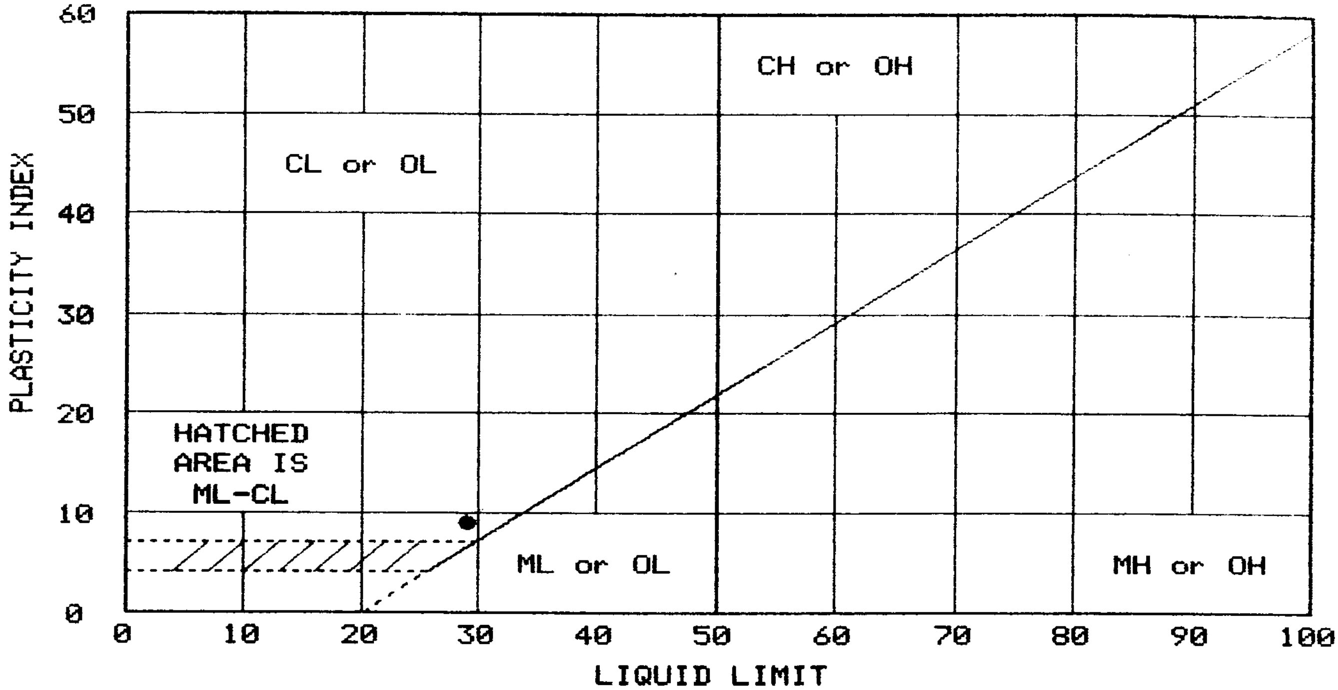
Date: 02-12-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-R-T-5
SAMPLE: 8
NAT.MOST. 41%
SPEC. GRAV. 2.66

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	USCS	AASHTO
●	SAND, CLAYEY, BROWN	29	20	9	27.8	SC	A-2-4(0)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

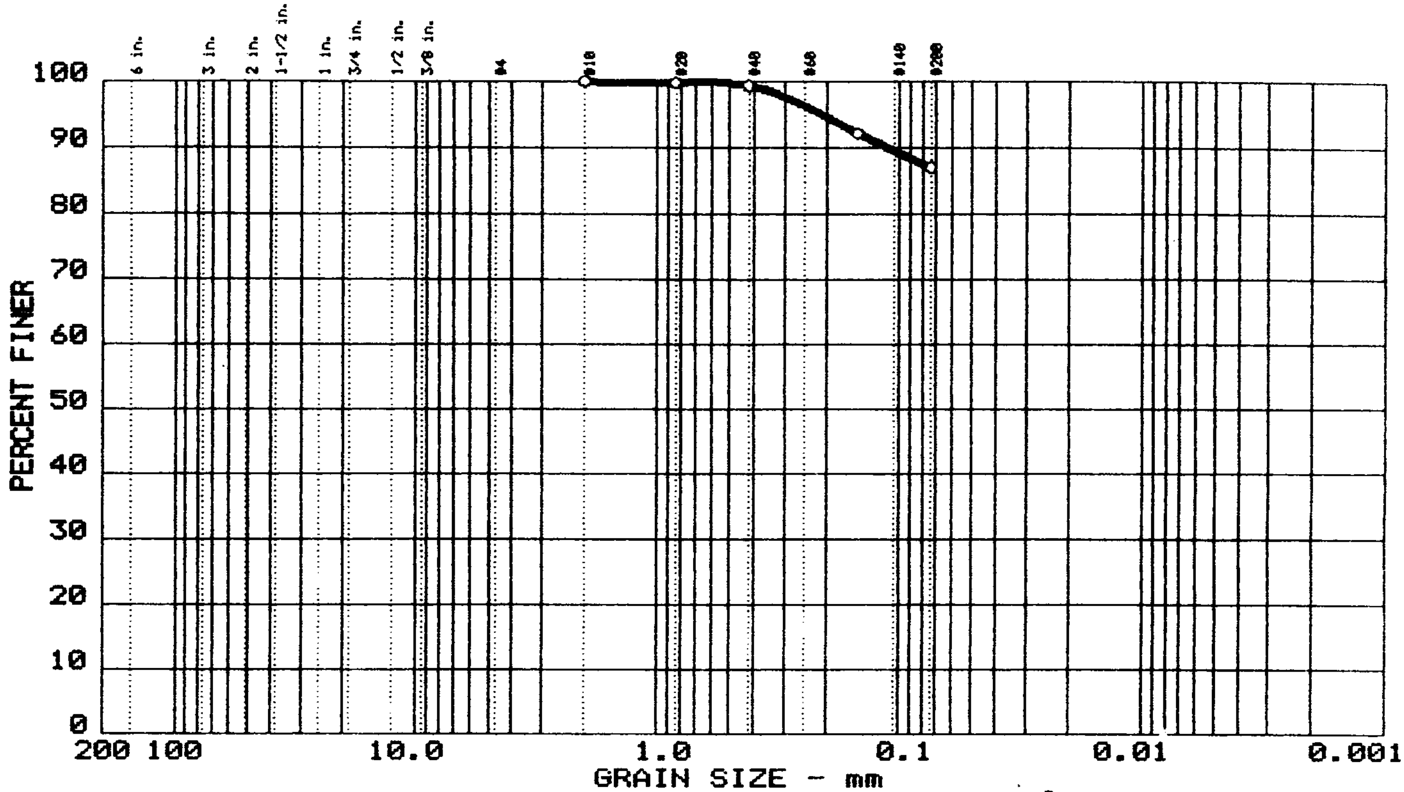
Date: 02-12-96

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-R-T-5
SAMPLE: 8
NAT.MOST. 41%
SPEC. GRAV. 2.66

Fig. No.

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	13.0	87.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	50	23								

MATERIAL DESCRIPTION	USCS	AASHTO
o CLAY, SILTY, LITTLE SAND, DARK BROWN	CL	A-7-6(22)

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R.

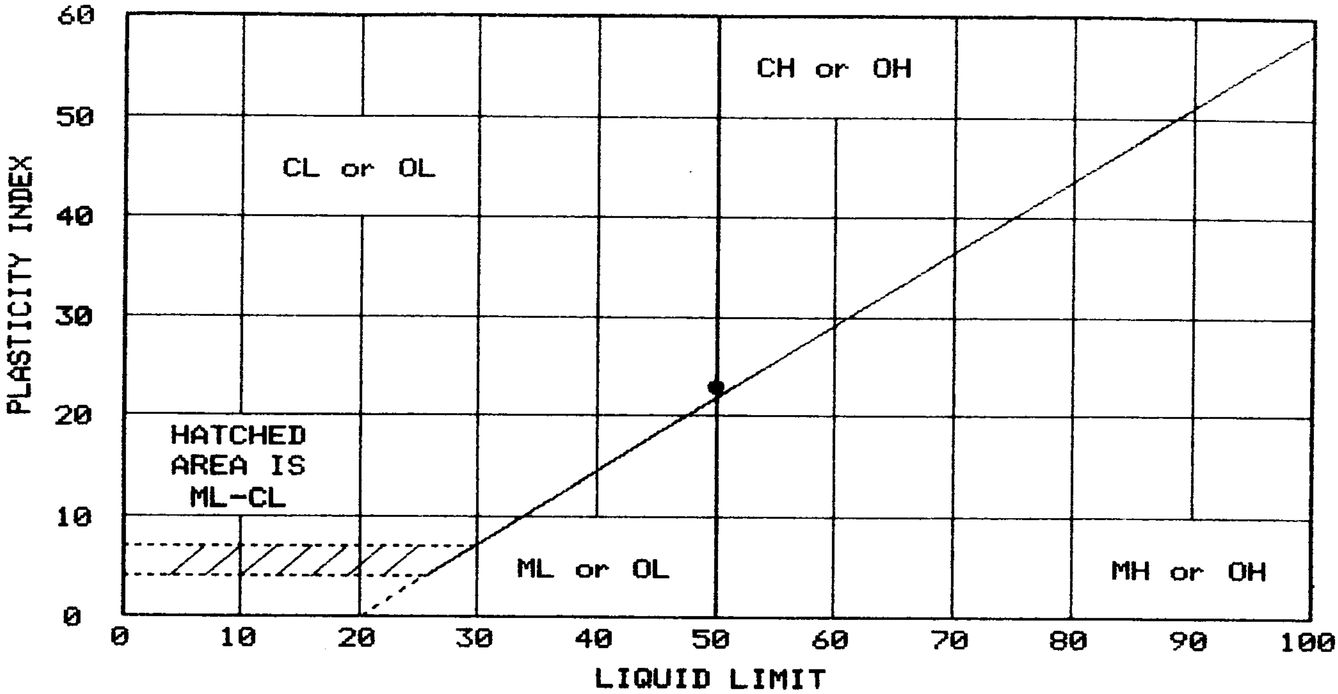
Date: 02-07-96

Remarks:
BOR. C-B-R-T-6
SAMPLE: 4
NAT.MOST. 39%

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	USCS	AASHTO
●	CLAY, SILTY, LITTLE SAND, DARK BROWN	50	27	23	87.0	CL	A-7-6(22)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

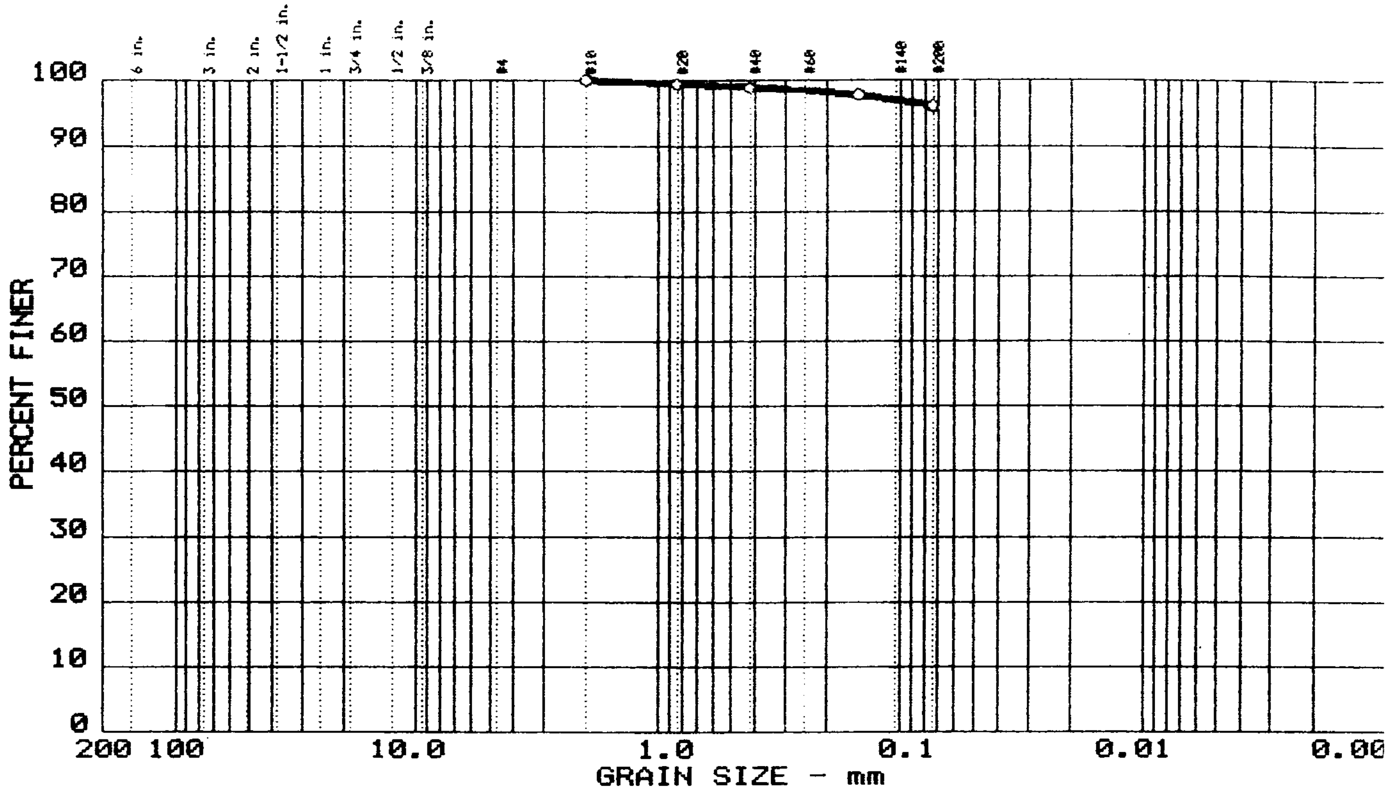
Date: 02-07-96

Remarks:
BOR. C-B-R-T-6
SAMPLE: 4
NAT. MOST. 39%

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Fig. No.______

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	3.9	96.1	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	51	27								

MATERIAL DESCRIPTION	USCS	AASHTO
o CLAY, SILTY, TRACE SAND, YELLOWISH BROWN	CH	A-7-6(29)

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R.

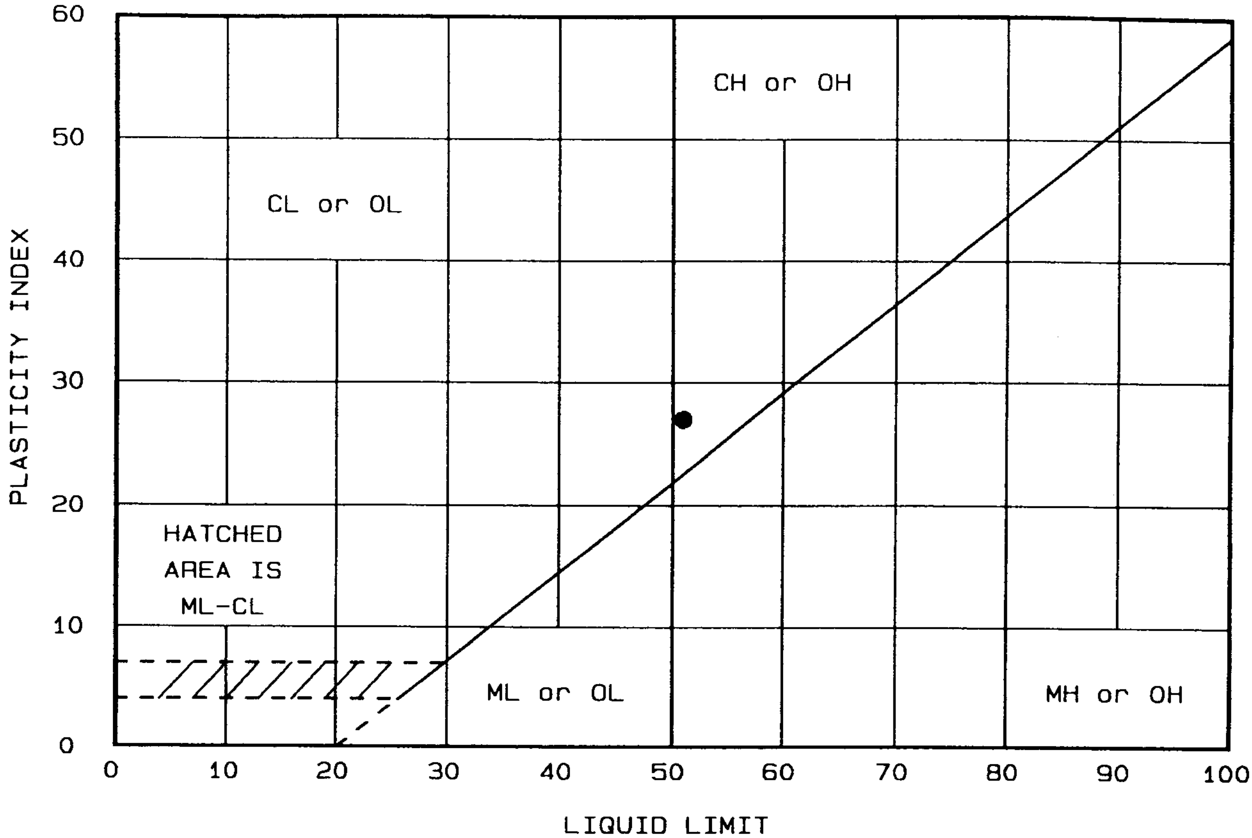
Date: 02-07-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-R-T-6
SAMPLE: 10
NAT.MOST. 45%

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	ASTM D 2487-90
● CLAY, SILTY, TRACE SAND, YELLOWISH BROWN	51	24	27	96.1	CH, Fat clay

Project No.:
Project: RIO ARECIBO PROJECT

Client: USACE
Location: ARECIBO P.R.

Date: 2-7-96

LIQUID AND PLASTIC LIMITS TEST REPORT

SUELOS INC.

Remarks:

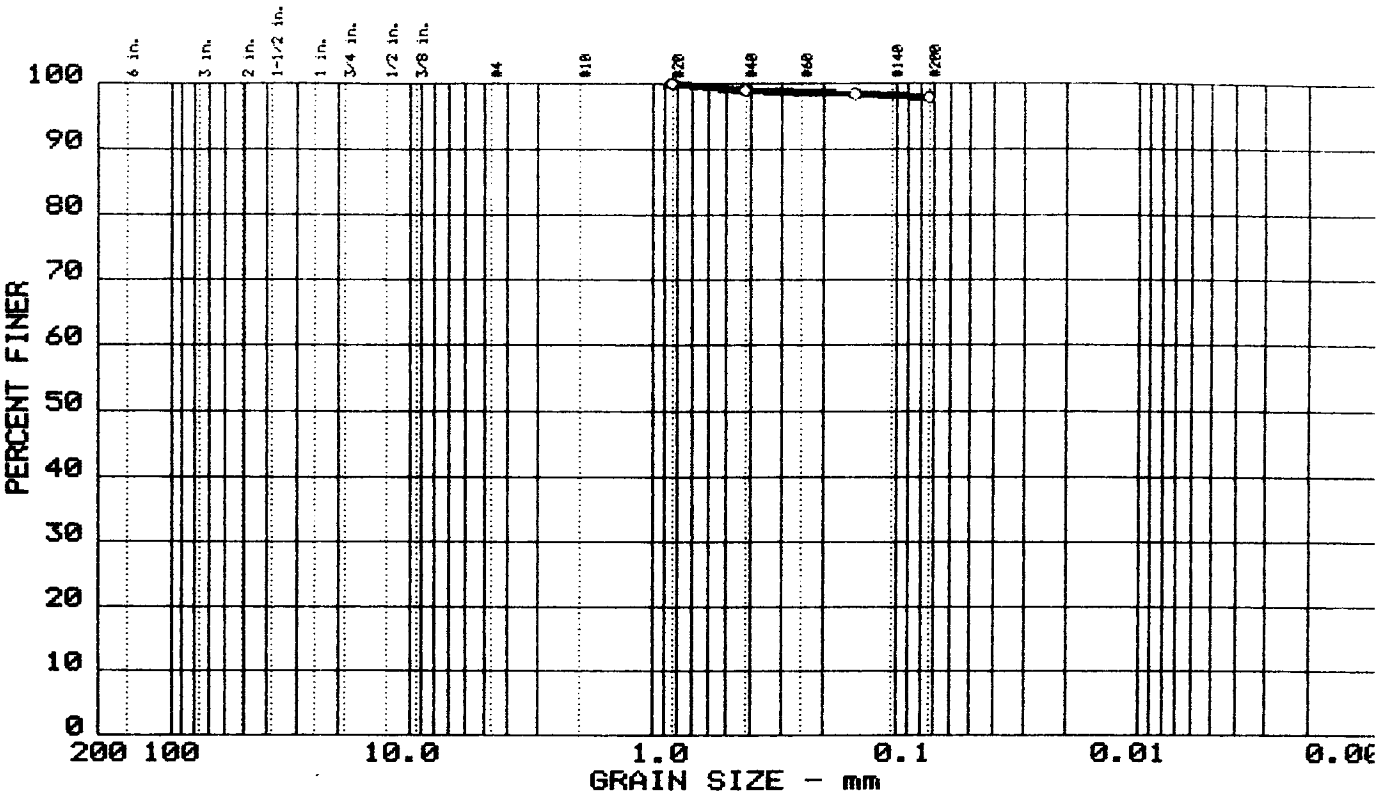
BOR. C-B-R-T-6

SAMPLE NO. 10

NAT. MOIST. 45%

Fig. No. 2

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	2.2	97.8	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	64	27								

MATERIAL DESCRIPTION	USCS	AASHTO
o SILT, CLAYEY, TRACE SAND, DARK BROWN	MH	A-7-5(34)

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R.

Date: 02-07-96

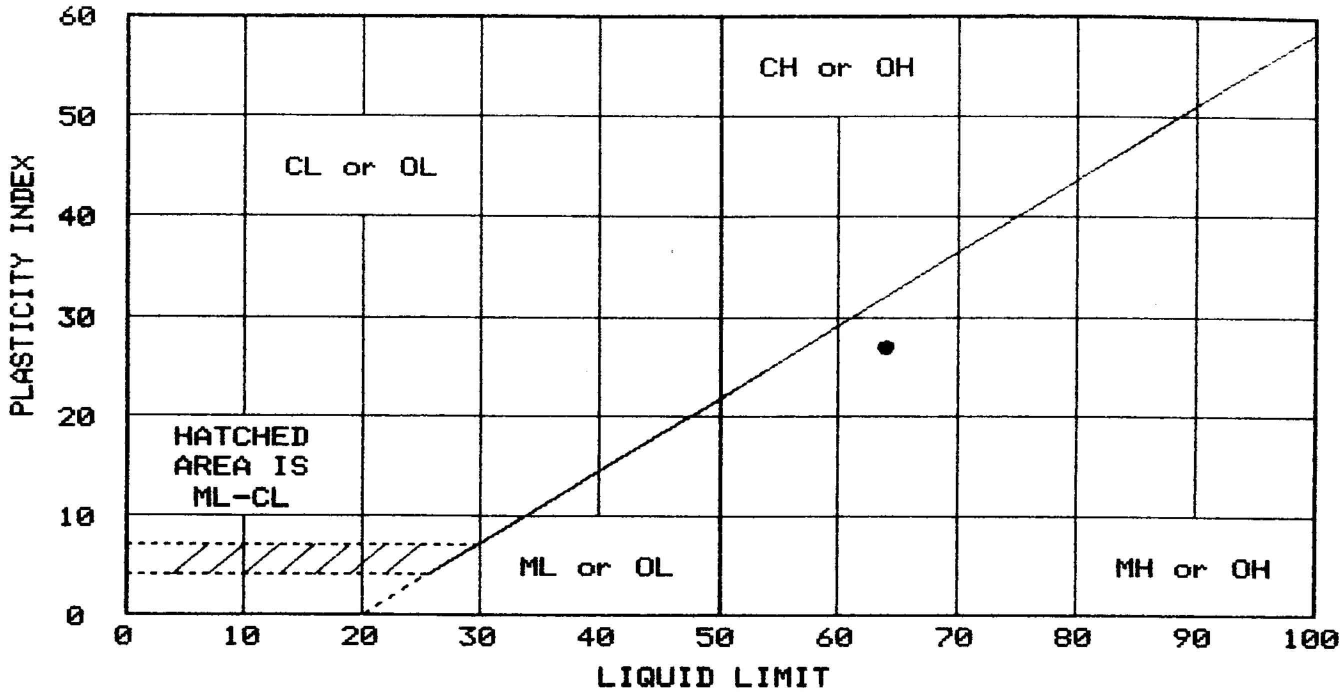
GRAIN SIZE DISTRIBUTION TEST REPORT

SUELOS INC.

Remarks:
BOR. C-B-R-T-8
SAMPLE: 3
NAT.MOST.39%

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	USCS	AASHTO
● SILT, CLAYEY, TRACE SAND, DARK BROWN	64	37	27	97.8	MH	A-7-5(34)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

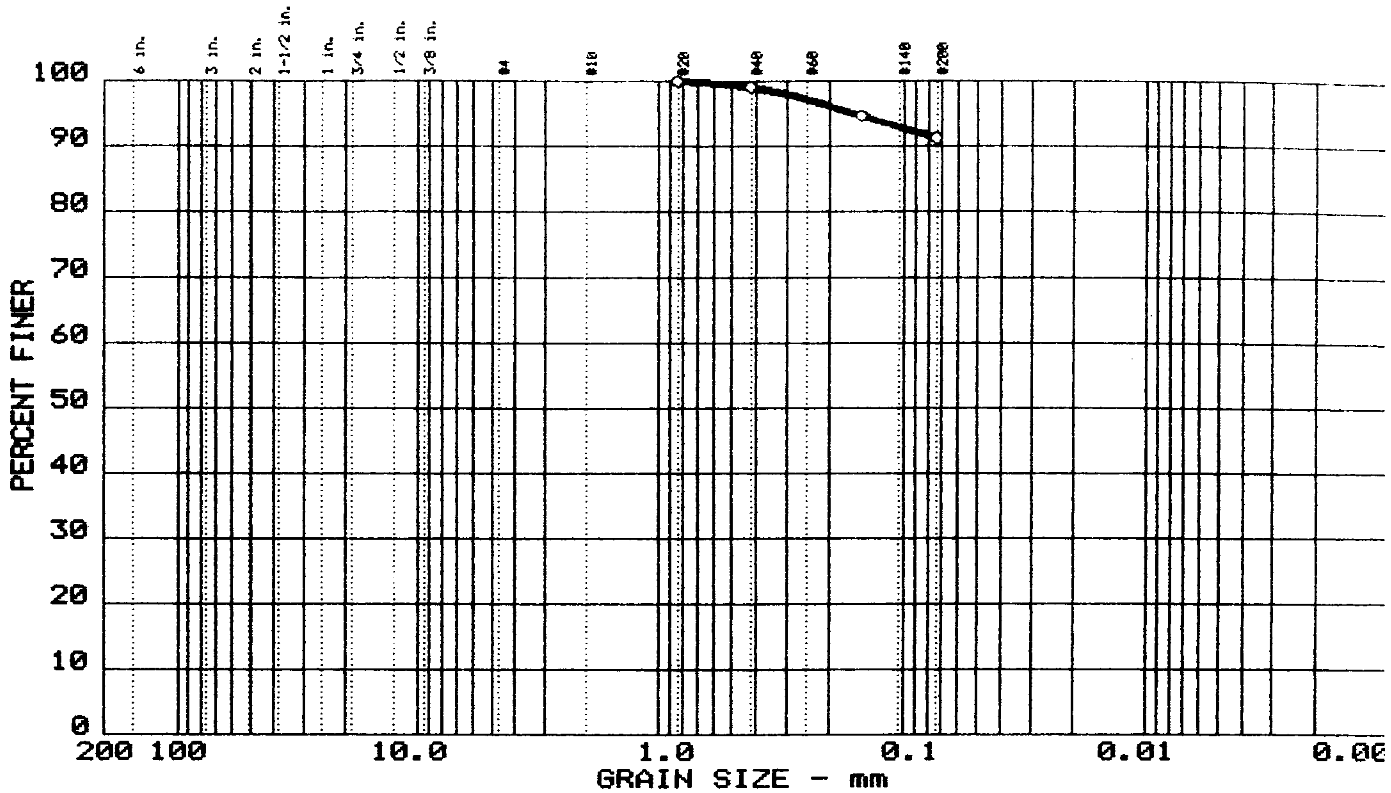
Date: 02-07-96

Remarks:
BOR. C-B-R-T-8
SAMPLE: 3
NAT.MOST. 39%

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Fig. No._____

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	8.7	91.3	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	52	24								

MATERIAL DESCRIPTION	USCS	AASHTO
o CLAY,SILTY ,TRACE SAND , YELLOWISH BROWN	CH	A-7-6(25)

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R.

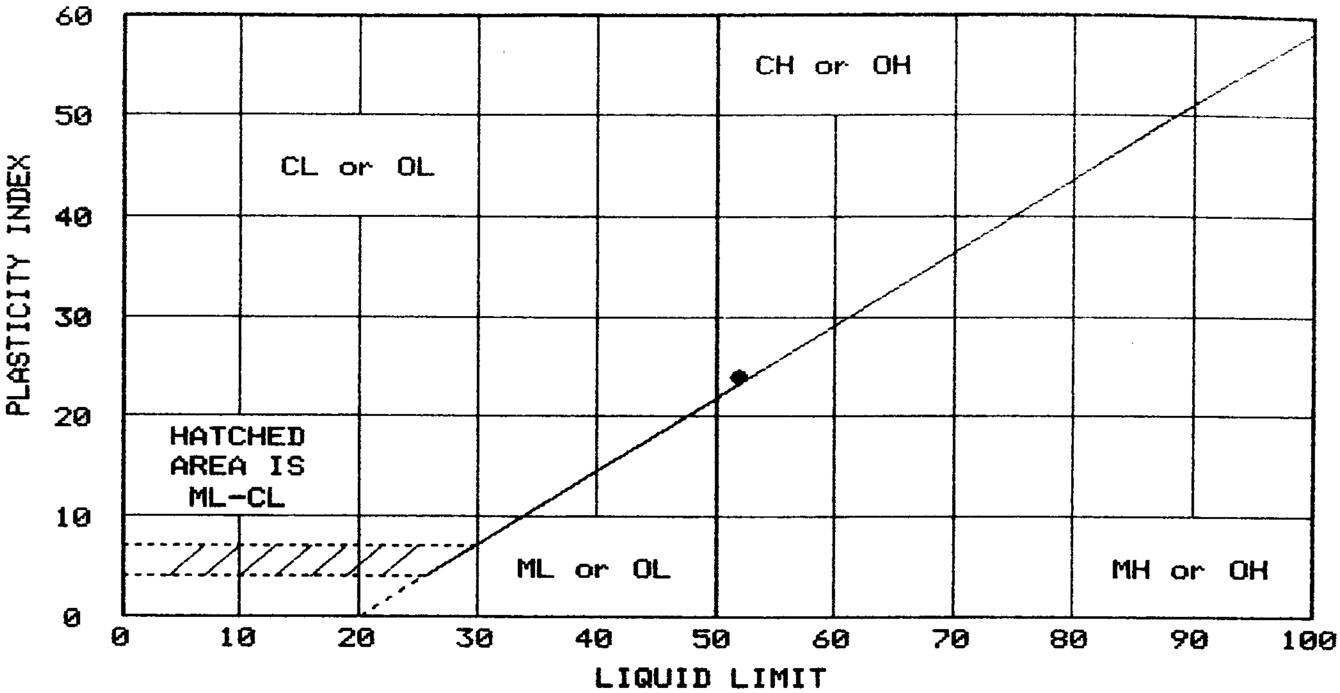
Date: 02-07-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-R-T-8
SAMPLE: 11
NAT.MOST.51%

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	USCS	AASHTO
● CLAY, SILTY, TRACE SAND, YELLOWISH BROWN	52	28	24	91.3	CH	A-7-6(25)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

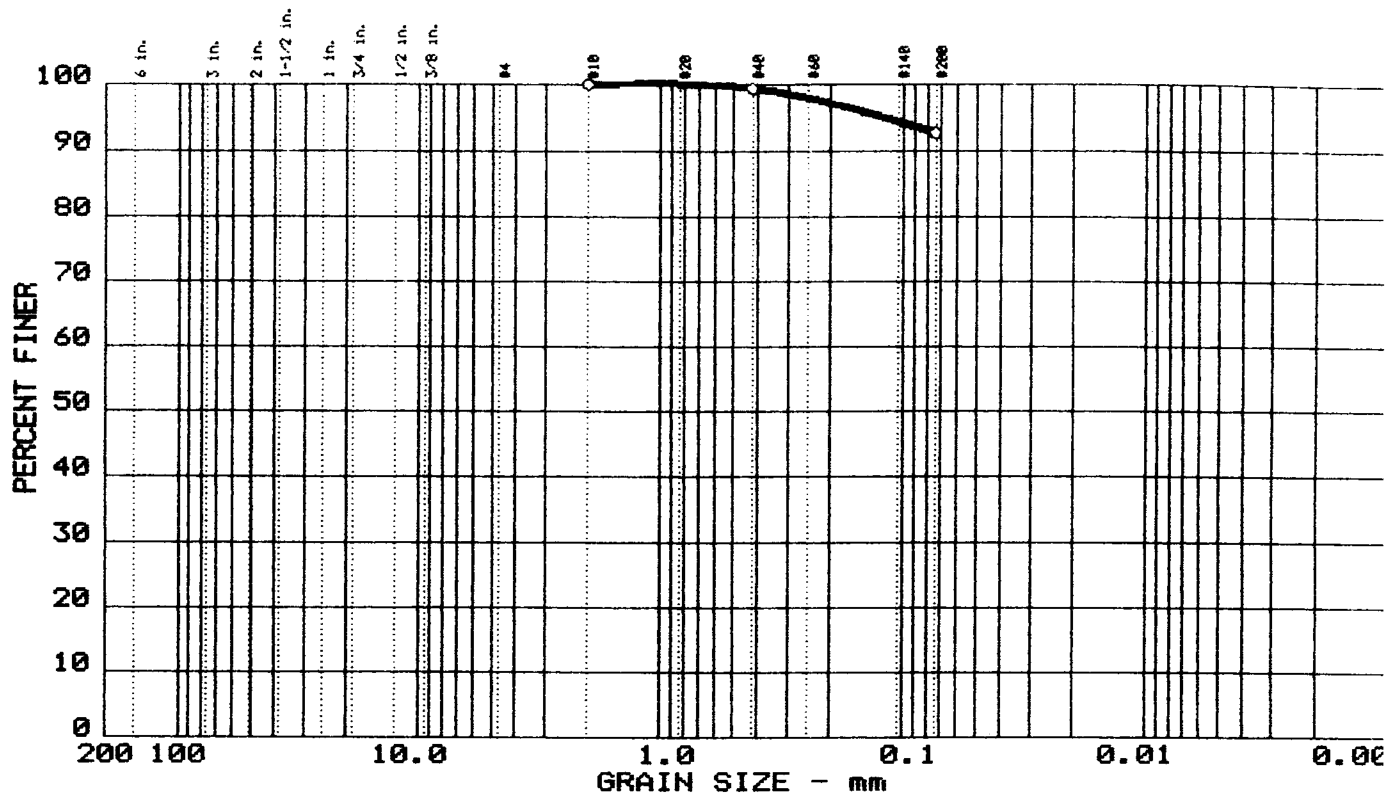
Date: 02-07-96

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-R-T-8
SAMPLE: 11
NAT.MOST. 51%

Fig. No.______

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	7.2	92.8	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	45	20								

MATERIAL DESCRIPTION	USCS	AASHTO
o CLAY, SILTY, TRACE SAND, BROWN AND YELLOWIS BROWN	CL	A-7-6(21)

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R

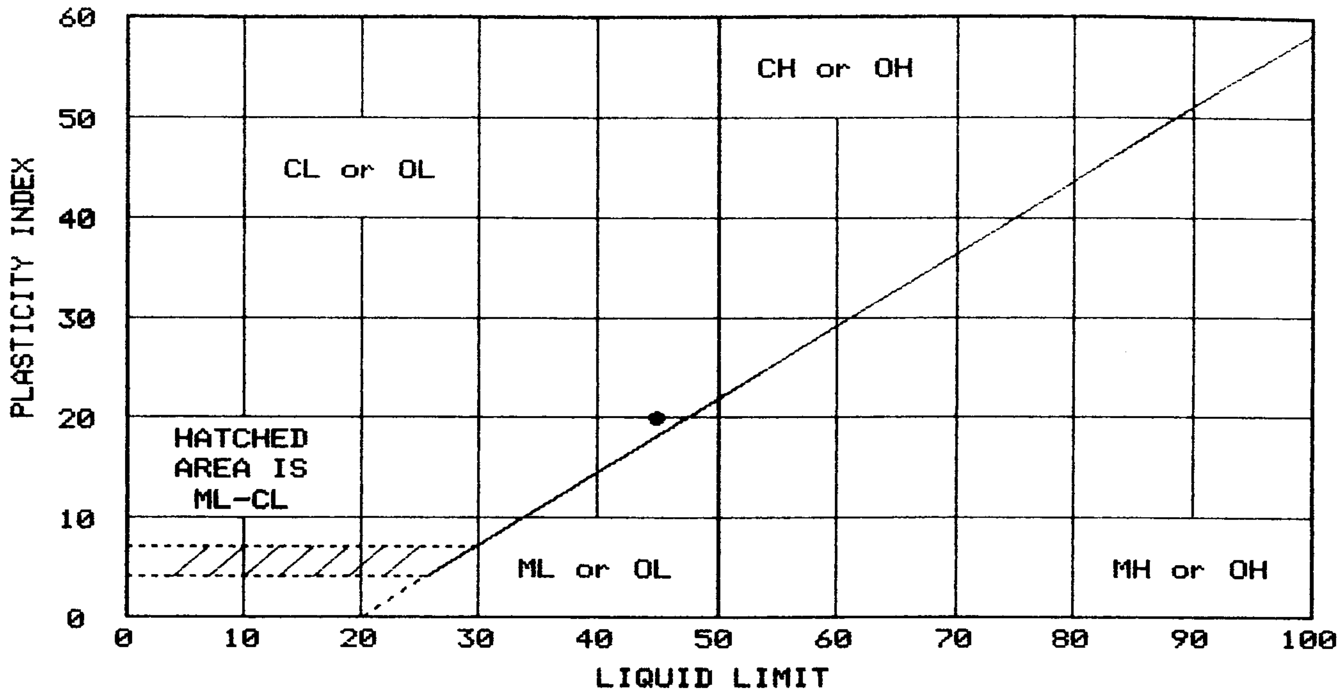
Date: 02-05-96

Remarks:
BOR: C-B-R-T-9
SAMPLE: 3
NAT.MOST.38%
SPEC. GRAV. 2.52

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	USCS	AASHTO
● CLAY, SILTY, TRACE SAND, BROWN AND YELLOWIS BROWN	45	25	20	92.8	CL	A-7-6(21)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

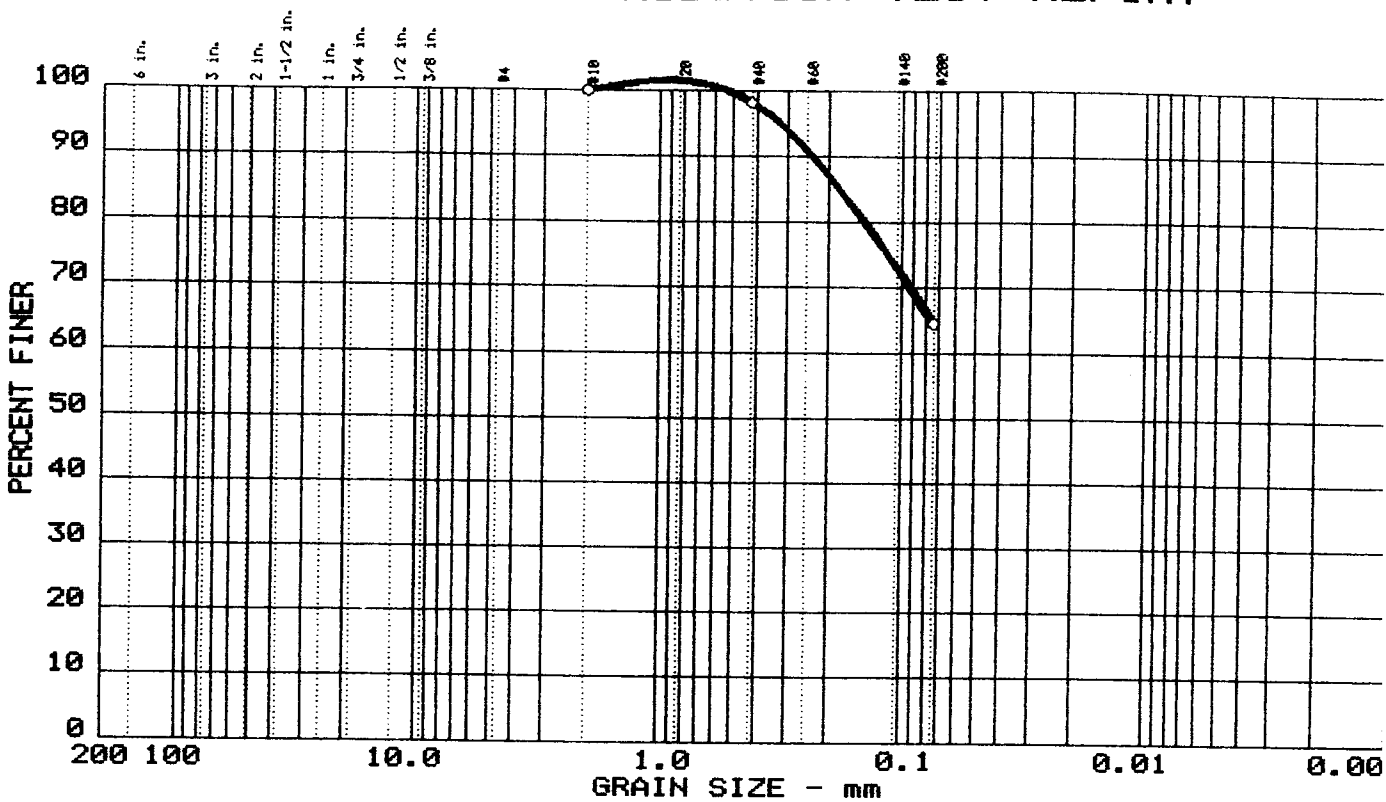
Date: 02-05-96

Remarks:
BOR. C-B-R-T-9
SAMPLE: 3
NAT.MOST. 38%
SPEC. GRAV. 2.52

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Fig. No.______

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	35.5	64.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	41	23	0.18							

MATERIAL DESCRIPTION	USCS	AASHTO
o CLAY, SILTY, SOME SAND, GRAY TO DARK GRAY	CL	A-7-6(13)

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R

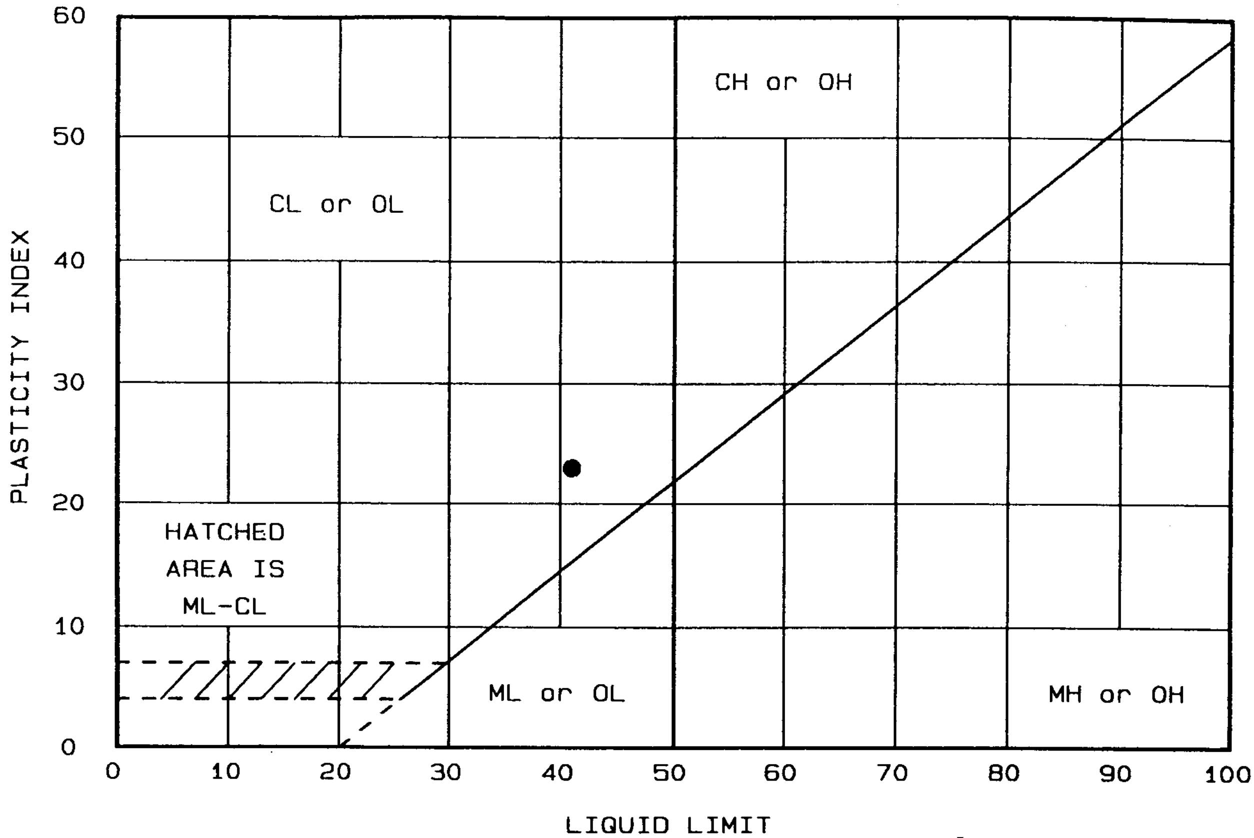
Date: 02-05-96

Remarks:
BOR: C-B-R-T-9
SAMPLE: 6
NAT.MOST.37%
SPEC. GRAV. 2.54

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	ASTM D 2487-90
● CLAY ,SILTY , SOME SAND , GRAY TO DARK GRAY	41	18	23	64.5	CL, Sandy lean clay

Project No.:
Project: RIO ARECIBO PROJECT

Client: USACE
Location: ARECIBO P.R.

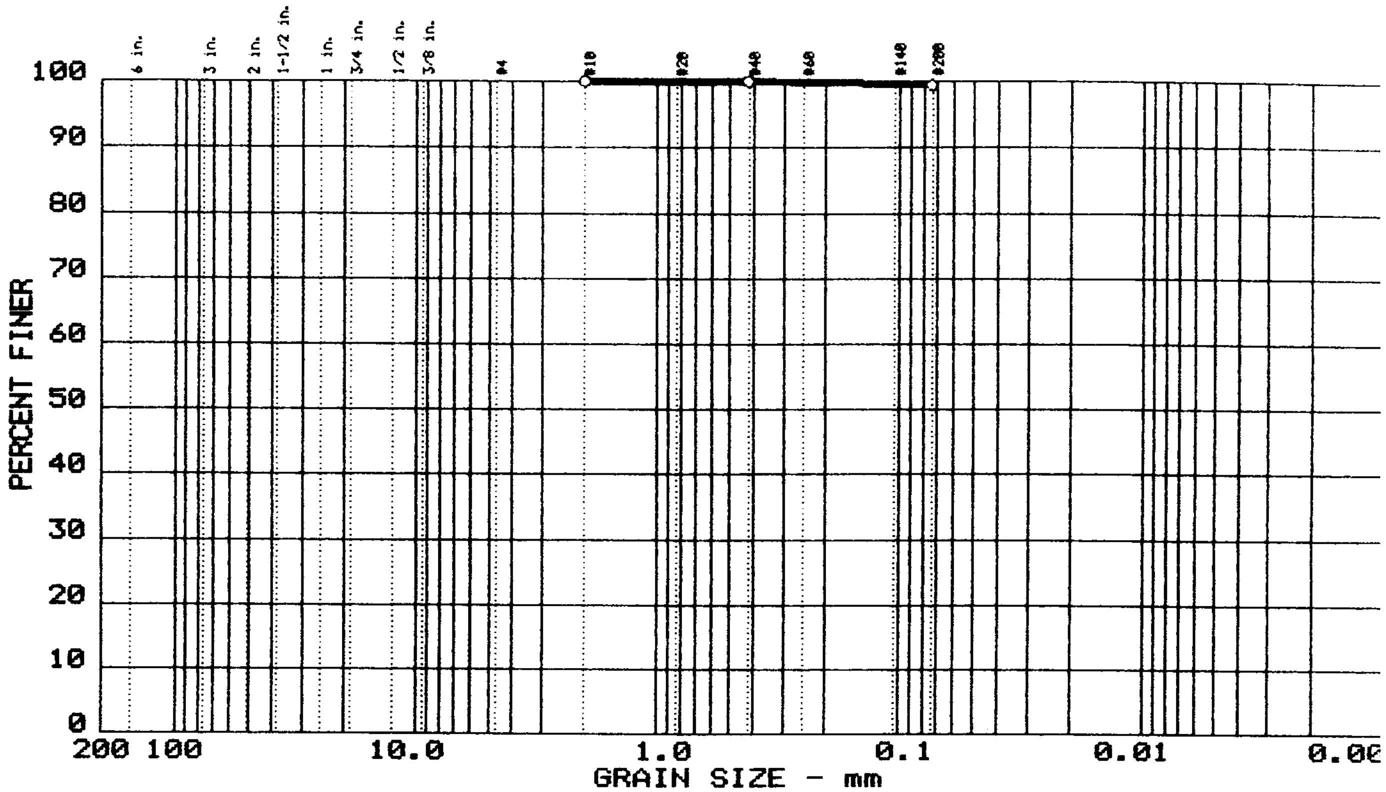
Date: 2-5-96

Remarks:
BOR. C-B-R-T-9
SAMPLE NO. 6
NAT. MOIST. 37%
SPEC. GRAV. 2.54

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Fig. No. 2

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	0.5	99.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	52	24								

MATERIAL DESCRIPTION	USCS	AASHTO
o CLAY,GREENISH GRAY	CH	A-7-6(30)

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R

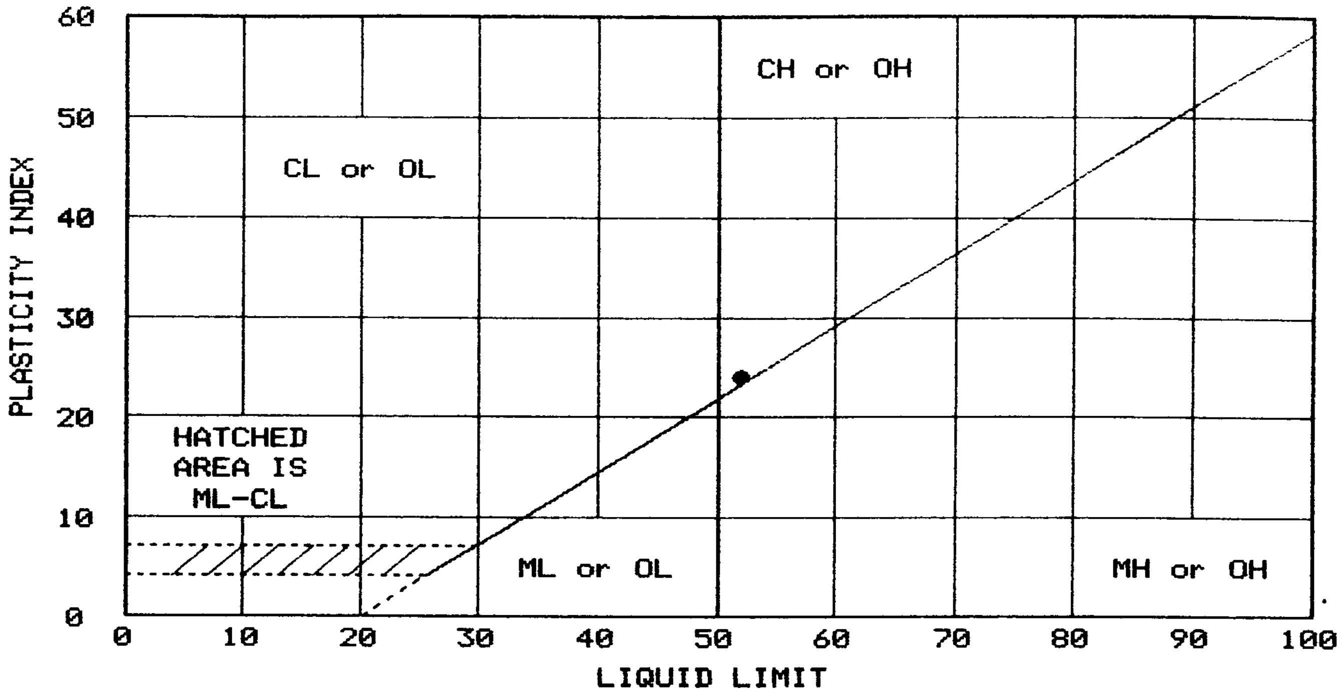
Date: 02-05-96

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Remarks:
BOR: C-B-R-T-9
SAMPLE: 10
NAT.MOST.63%
SPEC. GRAV. 2.58

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	USCS	AASHTO
●	CLAY,GREENISH GRAY	52	28	24	99.5	CH	A-7-6(30)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

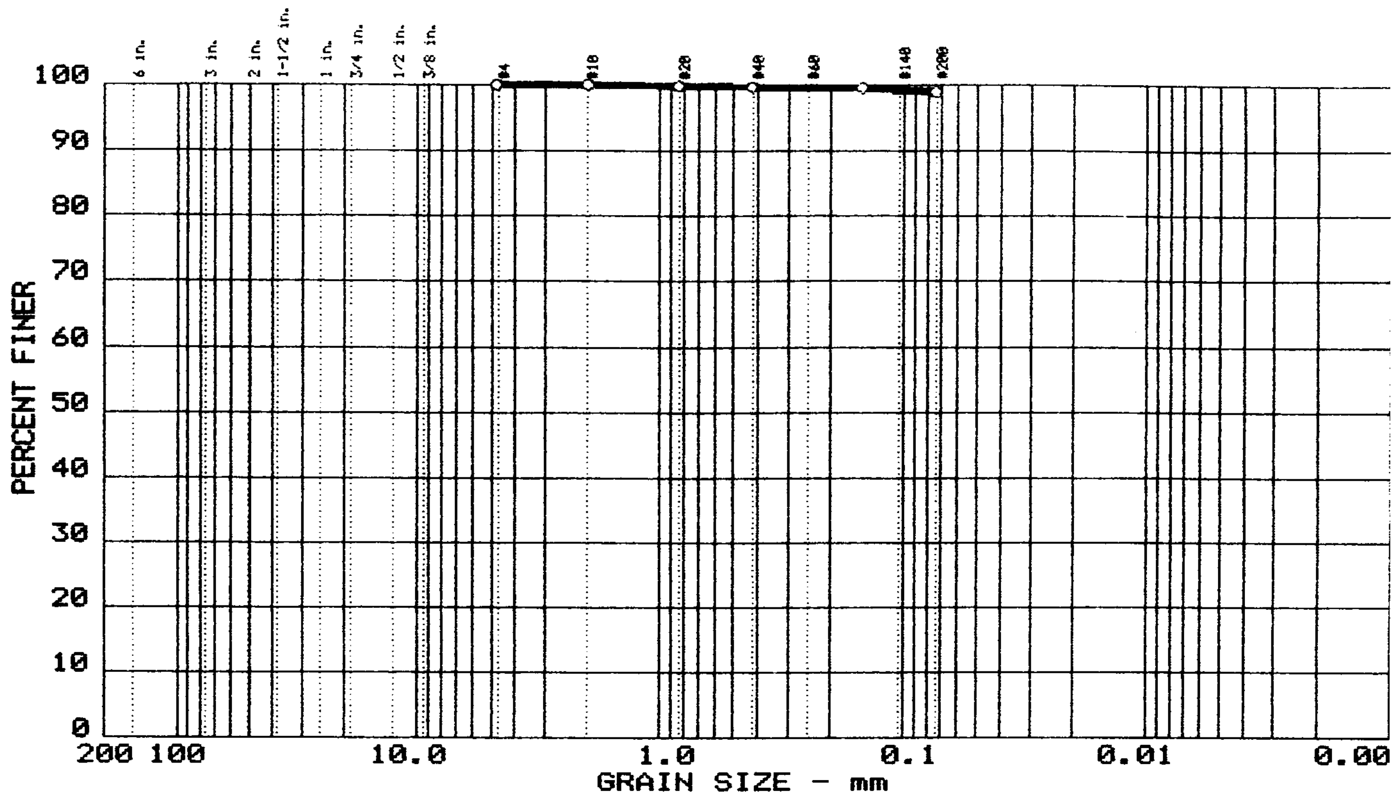
Date: 02-05-96

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-R-T-9
SAMPLE: 10
NAT.MOST. 63%
SPEC. GRAV. 2.58

Fig. No.______

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	0.0	1.1	98.9	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	45	19								

MATERIAL DESCRIPTION	USCS	AASHTO
o CLAY, SILTY, TRACE SAND, GRAY TO DARK GRAY	CL	A-7-6(21)

Project No.:
Project: RIO ARECIBO PROJECT
o Location: ARECIBO P.R.

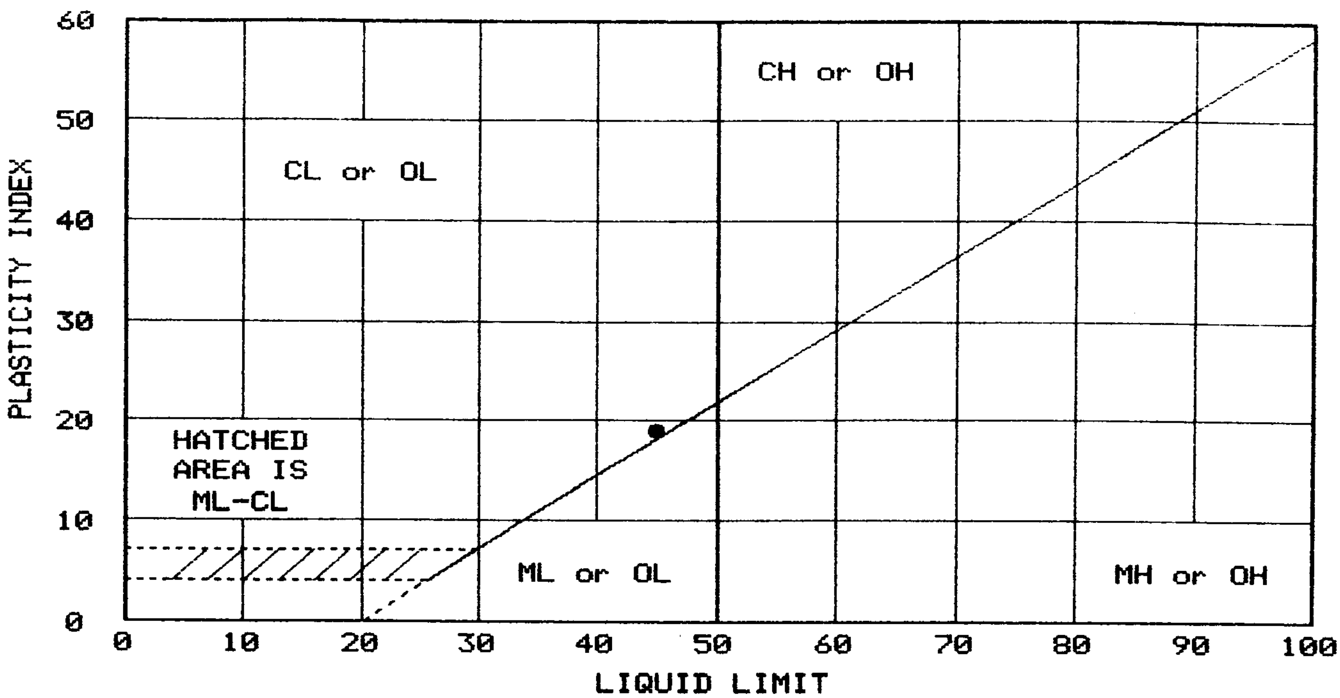
Date: 02-19-96

Remarks:
BOR. C-B-R-T-9
SAMPLE: 17
NAT.MOST. 41%

GRAIN SIZE DISTRIBUTION TEST REPORT
SUELOS INC.

Figure No.______

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	USCS	AASHTO
●	CLAY, SILTY, TRACE SAND, GRAY TO DARK GRAY	45	26	19	98.9	CL	A-7-6(21)

Project No.:
Project: RIO ARECIBO PROJECT

Client:
Location: ARECIBO P.R.

Date: 02-19-96

LIQUID AND PLASTIC LIMITS TEST REPORT
SUELOS INC.

Remarks:
BOR. C-B-R-T-9
SAMPLE: 17
NAT.MOST. 41%

Fig. No.______

1.4.7 Supplemental Information

Attached are:

"Rio Grande de Arecibo Flood Control Project, Geotechnical Investigation for Diversion Channels and Culverts, Arecibo, Puerto Rico" prepared by GeoConsult, Inc.

"Arecibo River, P.R., Geotechnical Investigation, Culverts under PR-10, Arecibo, Puerto Rico" prepared by GeoConsult, Inc.

GEOCONSULT
Geotechnical Engineers

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Tirso A. Alvarez, Ph.D.
Nelson Kawamura, Ph.D.
Carlos Regalado, MSCE
Cameron Oskvig, MSCE
Américo L. Fernández, Ph.D.
Carlos J. Rodríguez, MSCE

RÍO GRANDE DE ARECIBO FLOOD CONTROL PROJECT
GEOTECHNICAL INVESTIGATION FOR
DIVERSION CHANNEL AND CULVERTS
ARECIBO, PUERTO RICO
U.S. ARMY CORPS OF ENGINEERS
OCTOBER 10, 2003

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RÍO GRANDE DE ARECIBO FLOOD CONTROL PROJECT

GEOTECHNICAL INVESTIGATION FOR

DIVERSION CHANNEL AND CULVERTS

ARECIBO, PUERTO RICO

U.S. ARMY CORPS OF ENGINEERS

OCTOBER 10, 2003

1. INTRODUCTION

This conceptual investigation report is prepared for Delivery Order N°6 under Contract N° DACW17-01-D-0032. The report presents the results of a geotechnical investigation conducted along the proposed diversion channel for the referenced project and a proposed borrow area. The borrow area will be at a small hill located southwest from the intersection of PR-10 and PR-22. The diversion channel starts perpendicular to PR-10 at the south side of the intersection with PR-22, and extends towards the Río Grande River. The location of the site is shown in **Figure 1**. The project is intended to improve flood control of the Río Grande de Arecibo in areas surrounding the town of Arecibo. The contract covered by this task order includes construction of the following structures:

- A trapezoidal channel with 1V:3H side slopes with an average depth of 5 meters and a bottom width of approximately 5 meters.
- A culvert structure to be installed under PR-10 using a microtunnel.
- A borrow area to be used for levee construction.
- A culvert to provide flow from Río Santiago under the Arecibo levee.

P.O. BOX 362040, SAN JUAN, PUERTO RICO 00936-2040 • TELS. (787) 782-3554 • 783-3585 • FAX (787) 793-0410
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www.geoconsult-inc.com

The exploration included 10 borings and 12 test pits, and the corresponding laboratory tests. Continuous sampling was used in all borings. The core borings and test pits are located as follows:

BORING	DEPTH (feet)	X (feet)	Y (feet)	ELEVATION (feet)	SITE
CB-DC-14	21.0	402895.235	223665.200	21.870	Diversion Channel
CB-DC-15	21.0	404040.717	223789.326	17.667	
CB-DC-16	21.0	404210.964	225082.434	9.751	
CB-DC-17	21.0	404939.561	226568.866	10.492	
CB-DC-12	60.0	401446.047	223711.049	18.691	Culvert PR-10
CB-DC-13	60.0	401759.550	223800.130	16.840	
CB-BA2-1	40.5	397078.357	225302.510	164.965	Borrow Area
CB-BA2-2	40.5	398134.706	225493.639	159.043	
CB-BA2-3	40.5	397194.609	224342.190	200.152	
CB-RGA-14A	45.0	402704.670	232425.455	4.790	Culvert Levee
TP-DC-1	11.0	402278.064	223846.540	20.180	Diversion Channel
TP-DC-2	10.3	403465.760	223619.512	15.449	
TP-DC-3	10.8	404083.167	224567.748	16.899	
TP-DC-4	10.2	404497.614	225622.847	12.559	
TP-DC-5	9.2	405068.004	227251.124	10.213	
TP-BA2-1	10.3	397013.125	225282.933	165.582	Borrow Area
TP-BA2-2	10.2	398163.239	225496.900	159.578	
TP-BA2-3	10.0	397185.833	224347.183	199.565	
TP-BA2-4	10.5	397032.695	224969.627	163.203	
TP-BA2-5	5.2	397472.198	224862.823	67.981	
TP-BA2-6	6.2	397459.042	225243.842	172.442	
TP-BA2-7	11.3	397808.929	225463.170	169.742	

Table 1: Borings and test pits location.

Notes:

- Coordinates are in NAD 27 and elevations in NGVD 29. Monuments used for survey are ARH-67 and ARH-68.
- Boring CB-DC-13 was relocated from its proposed location, approximately 10 feet towards the east, due to its proximity to an electric line.
- Some tests pits and borings in the borrow area were relocated, as discussed during the task order negotiation, due to access difficulties.

The approximate location of the core borings and test pits is presented on **Figure 2** (sheets 1 to 5).

2. GEOLOGICAL SETTING

The project lies within the Arecibo Quadrangle (Geologic Map of the Arecibo Quadrangle, USGS Map I-551, R.P.Briggs-1968). The geology of the proposed Rio Grande de Arecibo Flood Control is characterized by Quaternary floodplain alluvium deposits (Qa) consisting of gradationally stratified layers of brown to dark yellowish brown clayey to silty gravel and sands of moderate to well sorting, as exposed in borings CB-DC-12 to CB-DC-17, and test pits TP-DC-1 to 5. Most of these layers derive from the physical and chemical disintegration of Tertiary-Cretaceous intrusive igneous bodies (Tki, Dioritic intrusive rocks; Tku, rocks of the Utuado pluton) and other late Cretaceous volcanic formations (Kt, Tetuán Formation; Ka, Alonso Formation) exposed along the Rio Grande de Arecibo in the municipality of Utuado (Geologic Map of the Utuado Quadrangle, USGS Map I-480, A.E.Nelson-1967). Also included are Tertiary limestone formations (Ta, Aguada Limestone; Tay, Aymamón Limestone; Tc/Tcm, Cibao Formation) extending from the middle south of Arecibo to the north area of Utuado.

Some of these deposits are overlaid by swamp deposits (Qs), as exposed in boring CB-RGA-14A from elevation 3.1 to -3.5 feet, consisting of gray to dark gray soft clay and sandy clays with organic content of partially decomposed plant debris.

At the borrow area, where borings CB-BA2-1 and 2, and test pits TP-BA2-1, 2, 4, 6, and 7 are located, the upper part of the hills exposes the Camuy Limestone (Tca), overlying the Aymamón Limestone (Tay), as indicated in boring CB-BA2-3 and test pits TP-BA2-3 and 5. The Aymamón Limestone is also clearly exposed around the irregular ridges between “mogotes” and at cut areas near the top of these hills.

3. GEOTECHNICAL CHARACTERIZATION AND CONCEPTUAL RECOMMENDATIONS

Borings were performed by rotary drilling with hollow stem augers in general accordance with ASTM D1452-84. Standard Penetration Tests were performed in general accordance with ASTM D1586-84 on all samples. Retrieved samples were classified and described in the field by the visual-manual procedure in general accordance with ASTM D2488, then stored in plastic jars and transported in wood core boxes to the laboratory for testing and water content determination (ASTM D2216-92). Standard penetration tests (SPT) N-values, in blows per foot, are shown on the drilling logs.

A detailed description of the soils and materials encountered in the borings is presented in boring logs included in **Appendix A**. These logs show the subsoil conditions found, on the dates and locations indicated in this report. Test pits were also performed and the logs are presented in **Appendix B.** Results of laboratory tests are shown in **Appendix C**. A summary of the samples tested is presented in the following table:

TEST PERFORMED	BORING ID	SAMPLE DEPTH
Sieve analysis and Atterberg Limits.	CB-DC-12	13.5 to 15.0 ft. 24.0 to 25.5 ft. 31.5 to 33.0 ft. 39.0 to 40.5 ft.
	CB-DC-13	10.5 to 12.0 ft. 19.5 to 21.0 ft. 33.0 to 34.5 ft. 40.5 to 42.0 ft. 45.0 to 46.5 ft.
	CB-DC-14	3.0 to 4.5 ft. 9.0 to 10.5 ft. 15.0 to 16.5 ft.
	CB-DC-15	3.0 to 4.5 ft. 9.0 to 10.5 ft. 15.0 to 16.5 ft.

TEST PERFORMED	BORING ID	SAMPLE DEPTH
Sieve analysis and Atterberg Limits.	CB-DC-16	6.0 to 7.5 ft. 10.5 to 12.0 ft.
	CB-DC-17	4.5 to 6.0 ft. 10.5 to 12.0 ft. 15.0 to 16.5 ft.
	CB-RGA-14A	4.5 to 6.0 ft. 10.5 to 12.0 ft. 19.5 to 21.0 ft. 42.0 to 43.5 ft.
Sieve analysis, Atterberg Limits and Standard Proctor.	TP-BA2-1	8.7 ft.
	TP-BA2-2	6.0 ft.
	TP-BA2-3	3.0 ft.
	TP-BA2-4	10.2 ft.
	TP-BA2-5	4.5 ft.
	TP-BA2-6	3.0 ft.
	TP-BA2-7	11.0 ft.
	TP-DC-1	7.0 ft.
	TP-DC-2	6.5 ft.
	TP-DC-3	6.0 ft.
	TP-DC-4	6.5 ft.
	TP-DC-5	4.0 ft.

TABLE 2: Summary of samples tested.

Note: Moisture content was determined for every sample extracted.

3.1 Culvert under PR-10

Borings CB-DC-12 and CB-DC-13 were drilled at each side of PR-10 where the culvert structure will be installed by microtunneling. Both borings show the presence of an upper layer of firm lean clay varying in depth from approximately 1.0 to 3.0 feet. The underlying soil corresponds to fat clay to approximately 27.5 feet at boring CB-DC-12 and 17.0 feet on boring CB-DC-13. This layer varies in consistency with depth and is found in a firm condition near the surface, to depths that vary between 8.0 and 9.0 feet. The fat clay becomes soft until reaching the contact with the underlying layer.

Below the fat clays, there exists a thin layer of sand with silt at borehole CB-DC-12 from 27.5 to 30 feet. At borehole CB-DC-13 the sandy material is called silty sand or clayey sand and is found to approximately 27.5 feet. This sandy layer is followed by soft fat clay. The soft clay extends to depths of 44.5 and 49.5 feet.

At boring CB-DC-12, the soft clay is followed by soft inorganic silt to a depth of 51.5 feet. At boring CB-DC-13, the sand layer is followed by dense clayey sand to a depth of 50 feet. Both borings show fat clay for the remainder of the boring. At boring CB-DC-12, the fat clay is soft, whereas the fat clay is firm to hard at boring CB-DC-13.

This layer varies in consistency with depth and is found in a firm condition from the contact with the upper lean clay to depths that vary between 7.5 to 9.0 feet. It then becomes soft until reaching the contact with the underlying layer, which corresponds to loose clayey and silty sands that extend to 27.5 and 30.0 feet. Underlying the sand, a layer of soft fat clay was found that extends to depths varying from 44.5 to 49.5 feet. From these depths to 52.0 feet at boring CB-DC-12, soft inorganic silt was found. Boring CB-DC-13 shows very dense clayey sand to a depth of 50.0 ft. Underlying the above materials to the end of the borings, fat clay was found with soft consistency at boring CB-DC-12 and firm to hard consistency at boring CB-DC-13.

Based on the soil profile at this site and assuming that the culverts will be installed somewhere within the softer materials (above 45 feet) the installation of the culverts by microtunneling seems to be feasible. However, the soft soil conditions found in these two borings may not represent the condition that will be encountered while jacking the tunnel, since consolidation of the soft material has occurred due to loading from the PR-10 embankment. A shaft will be needed to serve as a reaction to the jacking force in one of its walls. The installation of sheet piles to build such a shaft also seems to be feasible and probably will show easy driving to the depth required for stabilization. Depending on the required bottom elevation of the shaft, the design would probably require a bracing system and must take into consideration high values of active coefficients of earth pressure for the very soft upper soils. Due to the relatively short lengths of the culverts, we recommend to use the pipe jacking method (possibly with manual jacks) advancing from one side. If the pipe jacking method is used, it is also recommended to use bentonite mix or similar to attempt to reduce the friction in the soil-pipe contact and ease the pipe jacking. Most probably the culvert will be below the natural ground water table. Due to the presence of clays (based on only two borings) it does not seem necessary to install a dewatering system to lower the surrounding ground water level. However, a pumping system must be installed in the shaft to pump water seeping from the excavation and draining from the tunnel. In the event sand seams are encountered, problem-specific measures must be implemented.

3.2 Culvert under Arecibo Levee

Boring CB-RGA-14A was drilled in an area close to the proposed location of the culvert under the Arecibo levee. The soil conditions in this boring are characterized as interbedded layers of sands and clays that vary in thickness from 1.0 to 3.0 feet and thicker layers of approximately 13.0 feet. The first 2.0 feet correspond to a fill composed of clayey materials. The underlying strata, to a depth of 8.0 feet, consist of interbedded layers of silt and clay with soft consistency and loose sands. Beyond 8.0 feet the interbedded layers of clays and sands exhibit firm consistency and are medium to dense, respectively. For the construction of the culvert, the diversion of the Santiago River will be necessary. Such diversion could be achieved by the construction of a channel towards the Arecibo River. Once the channel is constructed, a platform should be built with dumped material across the Santiago River section, upstream and downstream from the culvert location. Provisions must be made to pump water seeping from the Arecibo River outside the working area. Assuming the culvert will be founded close to the Santiago River bed elevation, and considering the difference in elevation between the location of boring CB-RGA-14A location and the river bed, we estimate that the culvert will be founded on a layer of dense to very dense sand. We anticipate the required bearing capacity can be achieved on these competent materials. However, it is our perception that the soft soils at the middle of the Santiago River could extend deeper; in this case, soil improvement or replacement might be necessary to achieve the required bearing capacity. Differential settlements along the culvert length could be analyzed using new borings along the culvert. Alternatively, frequent joints could be used to account for settlements along the culvert. It is also important to review soil conditions at the locations where the culvert ends and passes under the levee.

At those locations where the levees require 90 degree corners, they will be subjected to short-term tensile stresses. It might be desirable to increase safety of the levees using crack-stoppers (graded sand zones) at these areas, depending on their height.

3.3 Diversion Channel

Core borings CB-DC-14 to 17 were drilled along the diversion channel. Test pits TP-DC-1 to 5 were also dug along the channel. The channel runs through the alluvial deposit and its section intersects interbedded layers of sands and clays that widely vary in density and consistency. We do not anticipate failure of the very gentle slopes proposed for construction. However, several existing superficial drainage channels that run through the various farms that are crossed by the channel were observed. Considering this fact, some discharge solutions might be necessary to maintain the integrity of the channel. In terms of constructability we do not anticipate major inconvenience, although the presence of high plasticity clays at the bottom of some channel portions could make it more difficult to achieve an appropriate channel bottom.

Standard Proctor tests were performed in the diversion channel test pits and at the borrow area. The results are presented in the following table:

TEST PIT	DEPTH (feet)	DESCRIPTION	CLASSIFICATION		Maximum Dry Density (pcf)	Optimum Water Content (%)
			ASTM	AASHTO		
TP-DC-1	7.00	Elastic Silt	MH	A-7-5	90.0	29.0
TP-DC-2	6.50	Silt	ML	A-7-6	96.3	23.0
TP-DC-3	6.00	Poorly Graded Gravel with Silt and Sand	GP-GM	A-1-a	91.8	27.0
TP-DC-4	6.50	Silt	ML	A-7-5	93.0	25.0
TP-DC-5	4.00	Elastic Silt	MH	A-7-5	88.6	30.0
TP-BA2-1	8.67	Poorly Graded Gravel with Silt and Sand	GP-GM	A-1-a	99.9	20.0
TP-BA2-2	6.00	Silty Gravel with Sand	GM	A-1-b	110.5	17.0
TP-BA2-3	3.00	Silty Gravel with Sand	GM	A-1-a	105.2	19.0
TP-BA2-4	10.17	Silty Gravel with Sand	GM	A-1-b	105.1	19.0
TP-BA2-5	4.50	Clayey Gravel with Sand	GC	A-2-7	97.3	23.0
TP-BA2-6	3.00	Clayey Gravel with Sand	GC	A-2-6	99.8	23.0
TP-BA2-7	11.00	Silty Sand with Gravel	SM	A-4	98.2	20.0

Table 3: Summary of Standard Proctor Tests.

The interbedded nature of sands and clays in the alluvial deposit will make it difficult to separate the materials extracted from the channel. It is our opinion that when the materials are tested separately, the granular materials are satisfactory for compaction and the fine materials are not. However, we suggest evaluating the possibility of testing mixed material in proportions similar to those that might occur in the field during construction. Such test results will be more representative of the site condition. Unless these tests are conducted, we would not recommend the use of the materials extracted from the diversion channel.

3.4 Borrow Area

The geotechnical exploration on the borrow area included three core borings identified as CB-BA2-1 to 3 and seven test pits identified as TP-BA2-1 to 7. The three borings showed the presence of a saprolitic limestone that exhibits the appearance of sands and gravels in the sampler. The borings were drilled on top of a hill. The saprolitic limestone can be observed in previous cuts done on this hill. Drilling was done with continuous sampling using a spoon sampler for the entire exploration depth (40.5 feet). Initial refusal was found at 20 and 15 feet in borings CB-BA2-2 and CB-BA2-3 respectively. As the boring was advanced further, refusal was then recorded at subsequent depths in these boreholes. The test pits were dug with a backhoe to a maximum depth of 10 feet and refusal was found at test pits TP-BA2-5 and 6 at 5.0 and 6.0 feet respectively. From boreholes and test pits, it seems that for the excavation to shallow depths (less than 10 feet) the use of explosives may not be necessary. However, if it is necessary to extract material deeper, then we recommend a rippability analysis using seismic refraction surveys. Proctor tests performed on samples taken from each of the test pits indicate that the material is adequate for compaction. However, the characterization of the material will widely depend on the extraction method used. An appropriate extraction method should be established in such a way that considers production time, as well as material properties after extraction.

Ground water was measured in all borings and test pits. Ground water levels were measured after drilling and do not necessarily correspond to the phreatic level. The measured depths are as follows:

CORE BORING	TOP OF BORING ELEVATION (feet)	GROUND WATER ELEVATION (feet)
CB-DC-14	21.9	6.9
CB-DC-15	17.7	8.7
CB-DC-16	9.8	0.8
CB-DC-17	10.5	3.2
CB-DC-12	18.7	9.7
CB-DC-13	16.8	8.8
CB-BA2-1	165.0	Not Encountered
CB-BA2-2	159.0	Not Encountered
CB-BA2-3	200.2	Not Encountered
CB-RGA-14A	4.8	0.8

TEST PITS	TOP OF TEST PIT ELEVATION (feet)	GROUND WATER ELEVATION (feet)
TP-DC-1	20.2	10.4
TP-DC-2	15.4	7.1
TP-DC-3	16.9	Not Encountered
TP-DC-4	12.6	Not Encountered
TP-DC-5	10.2	1.7
TP-BA2-1	165.6	Not Encountered
TP-BA2-2	159.6	Not Encountered
TP-BA2-3	199.6	Not Encountered
TP-BA2-4	163.2	Not Encountered
TP-BA2-5	68.0	Not Encountered
TP-BA2-6	172.4	Not Encountered
TP-BA2-7	169.7	Not Encountered

Table 4: Ground water elevations.

4. FINAL REMARKS

Be aware that all of the information gathered from the boreholes is discrete; therefore, interpolation is necessary to cover the area of interest. These data interpolations are based on the engineer’s judgment, supported by the soil soundings, laboratory tests and regional geology trends. However, due to possible changes on local site conditions, certain differences between the assumed soil models and the real site conditions might be expected. See **Appendix D** for important information about this geotechnical report.

This document has been prepared specifically for the previously referred client and project. It should not be used for design at any other location or any structure other than those mentioned in this report without review by a qualified geotechnical engineer.

October 10, 2003
San Juan, Puerto Rico
Project N° 3006-03

Javier Rodríguez
Geotechnical Engineer

Alan R. Crumley, P.E.
Managing Partner

GEOCONSULT

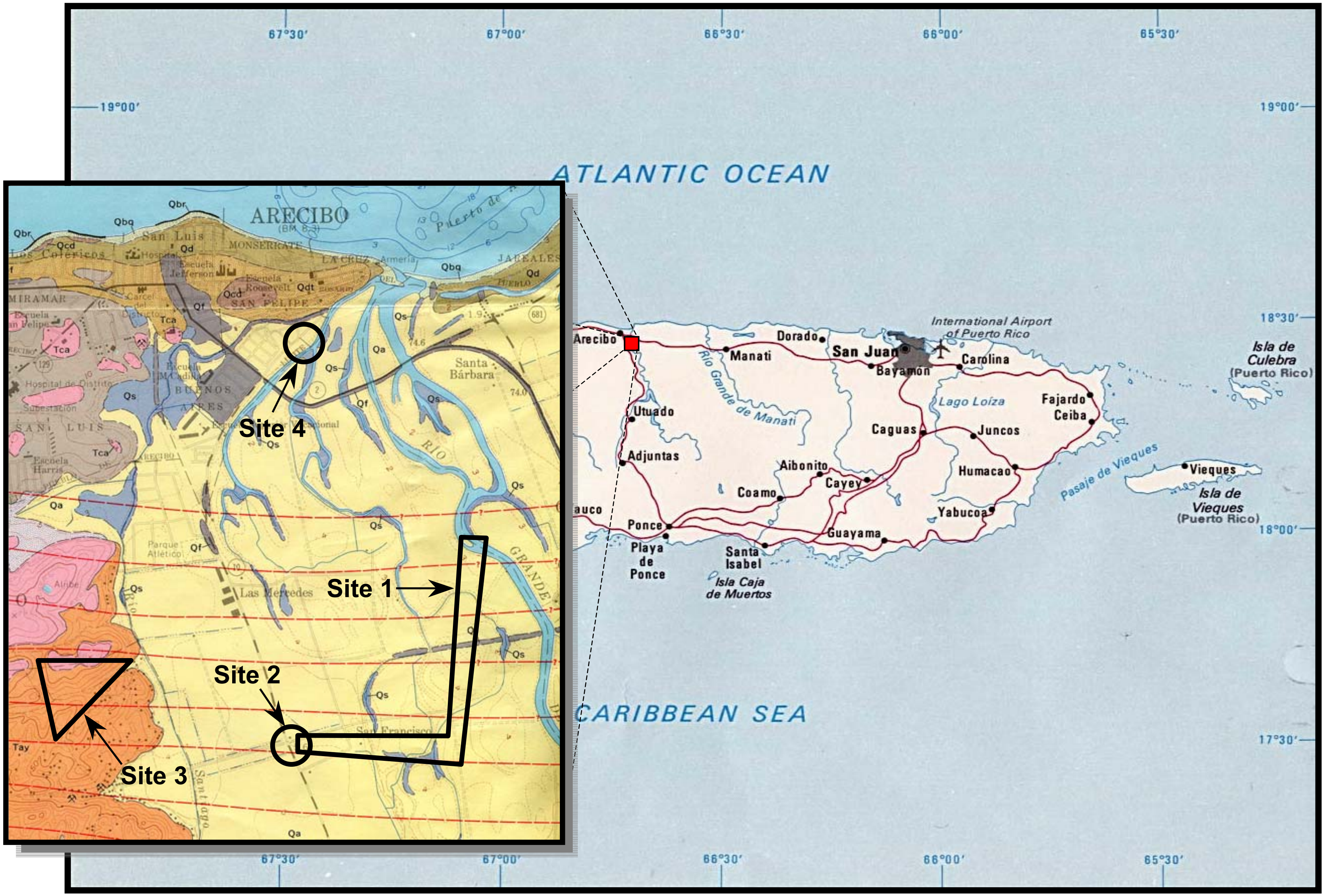
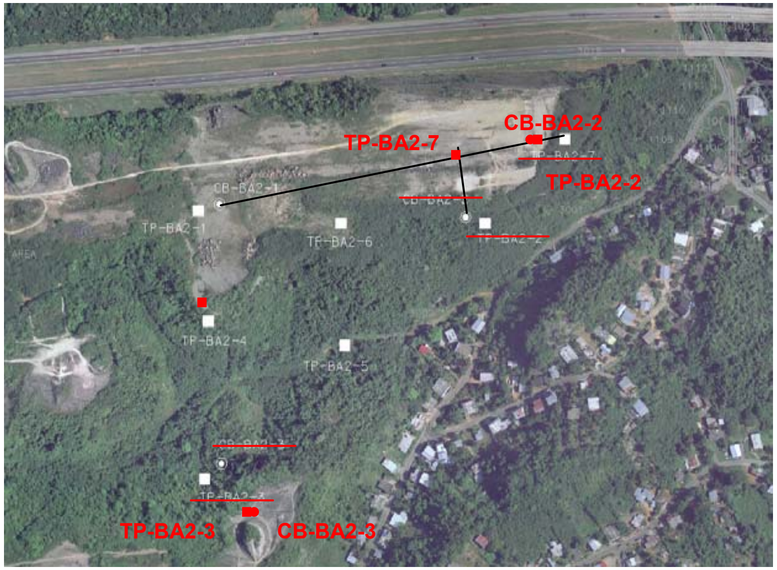


Figure 1. Site Location Plan and Generalized Geology. Rio Grande de Arecibo Flood Control Project, Diversion Channel and Culverts – Arecibo, P.R. (Contract #DACW17-01-D-0032)

From: Reginald P. Briggs (1968), "Geologic Map of the Arecibo Quadrangle, Puerto Rico". Map No. I-551, Department of the Interior, United States Geological Survey.



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Project	Reference	Description	Code No.	Sheet No.
Río Grande de Arecibo Flood Control Project, Diversion Channel and Culverts	Scale: Date: 09-03-2003 By: CJRM Revised:	Boreholes and Test Pits Locations	- Project No. 3006-03	Figure 2 1/5

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Project	Reference	Description	Code No.	Sheet No.
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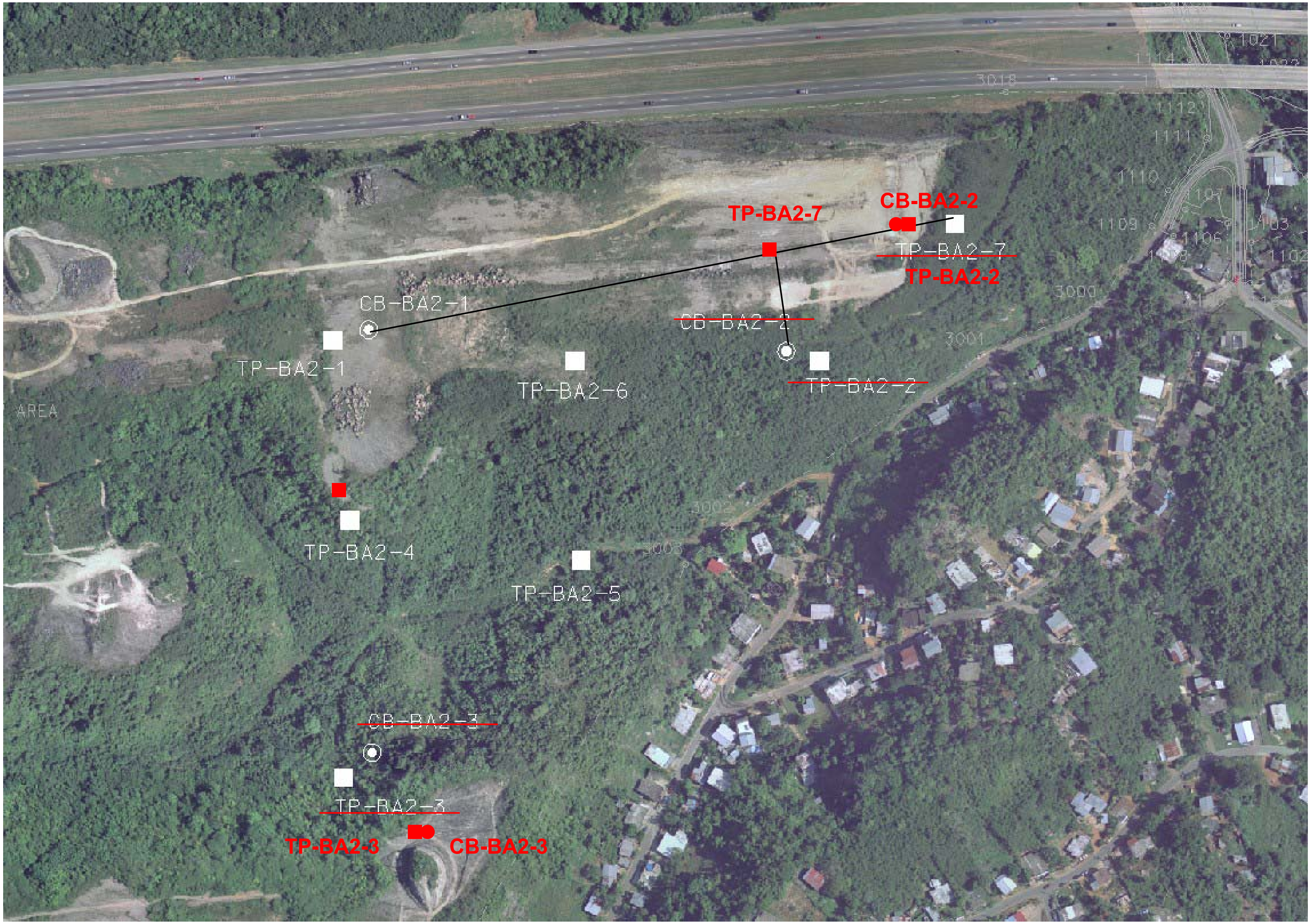

	Project	Reference	Description	Code No.	Sheet No.
GEOCONSULT *Geotechnical Engineers* P.O. Box 362040, San Juan P.R. 00936 Tel. (787) 782-3554 / Fax (787) 793-0410	Río Grande de Arecibo Flood Control Project, Diversion Channel and Culverts	Scale: Date: 07-03-2002 By: CJRM Revised:	Boreholes and Test Pits Locations	- Project No. 3006-03	Figure 2 5/5

APPENDIX A
BORING LOGS

Boring Designation CB-BA2-1

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 3 SHEETS

1. PROJECT: Arecibo River, PR; Alternate Borrow Area (South of PR-22)	9. SIZE AND TYPE OF BIT: See Remarks
	10. COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.) — HORIZONTAL: NAD27 — VERTICAL: NGVD29
2. BORING DESIGNATION: CB-BA2-1 — LOCATION COORDINATES: X = 397,078 Y = 225,303	11. MANUFACTURER'S DESIGNATION OF DRILL: CME-45B — ☐ AUTO HAMMER ☒ MANUAL HAMMER
3. DRILLING AGENCY: Geoconsult Inc. — CONTRACTOR FILE NO.: 3006-03	12. TOTAL SAMPLES — DISTURBED: 27 — UNDISTURBED (UD): 0
4. NAME OF DRILLER: CARLOS ROSA	13. TOTAL NUMBER CORE BOXES: 1
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED — DEG. FROM VERTICAL: — BEARING:	14. ELEVATION GROUND WATER: Not Encountered
	15. DATE BORING — STARTED: 08-13-03 — COMPLETED: 08-13-03
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: 165.0 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: 65 %
8. TOTAL DEPTH OF BORING: 40.5 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Bernard J. Seifert, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
165.0	0.0						165.0		
			SAND, well-graded (SAPROLITIC LIMESTONE), mostly subangular to subrounded fine to coarse-grained sand-sized limestone, little angular to subangular fine to coarse gravel-sized limestone, few silt, strong reaction with HCl, dry, weak cementation, homogeneous, white (SW)	67	1		SPT Sampler; 163.5	30, 38, 45	83
			From El. 163.3 to 161.0 Ft., little angular to subangular fine to coarse gravel-sized limestone	55	2		SPT Sampler; 162.0	15, 20, 22	42
			From El. 161.0 to 160.2 Ft., few angular to subangular fine gravel-sized limestone	55	3		SPT Sampler; 160.5	13, 22, 17	39
160.2	4.8		SAND, silty (SAPROLITIC LIMESTONE), mostly angular to subangular fine to coarse-grained sand-sized limestone, few angular to subangular fine to coarse gravel-sized limestone, strong reaction with HCl, dry, weak cementation, homogeneous, white (SM)	55	4		SPT Sampler; 159.0	10, 14, 16	30
				55	5		SPT Sampler; 157.5	16, 11, 13	24
				55	6		SPT Sampler; 156.0	11, 12, 13	25
				67	7		SPT Sampler; 154.5	12, 11, 11	22
				78	8		SPT Sampler; 153.0	11, 14, 20	34
			From El. 153.5 to 151.5 Ft., little angular to subangular fine to coarse gravel-sized limestone, pinkish white	78	9		SPT Sampler; 151.5	30, 20, 26	46
151.5	13.4		SAND, well-graded (SAPROLITIC LIMESTONE), mostly angular to subangular fine to coarse-grained sand-sized limestone, few angular to subangular fine to coarse gravel-sized limestone, few silt, strong reaction	78	10		SPT Sampler; 150.0	28, 27, 20	47

Depth scale: 0, 5, 10, 15

SAJ FORM 1836
JUN 02

(Continued)

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District		SHEET 2 OF 3 SHEETS
PROJECT Arecibo River, PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29
LOCATION COORDINATES X = 397,078 Y = 225,303	ELEVATION TOP OF BORING 165.0 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
			with HCl, dry, weak cementation, homogeneous, pinkish white (SW) From El. 149.0 to 145.8 Ft., some angular coarse gravel-sized limestone	55	11		SPT Sampler 148.5	17 18 21	39
				55	12		SPT Sampler 147.0	24 27 17	44
			From El. 145.8 to 144.7 Ft., little angular coarse gravel-sized limestone	55	13		SPT Sampler 145.5	28 30 20	50
			From El. 144.7 to 142.8 Ft., few angular fine to coarse gravel-sized limestone, few silt, pale yellow	67	14		SPT Sampler 144.0	19 20 21	41
142.3	22.7		From El. 142.8 to 142.3 Ft., white	67	15		SPT Sampler 142.5	20 29 32	61
			SAND, silty (SAPROLITIC LIMESTONE), mostly angular to subangular fine to coarse-grained sand-sized limestone, little angular to subangular fine to coarse gravel-sized limestone, strong reaction with HCl, dry, weak cementation, homogeneous, pale yellow (SM)	55	16		SPT Sampler 141.0	17 18 20	38
139.3	25.7			78	17		SPT Sampler 139.5	22 32 35	67
			SAND, well-graded (SAPROLITIC LIMESTONE), mostly angular to subangular fine to coarse-grained sand-sized limestone, little angular fine to coarse gravel-sized limestone, few silt, strong reaction with HCl, dry, weak cementation, homogeneous, very pale yellow (SW)	67	18		SPT Sampler 138.0	20 21 31	52
			From El. 137.9 to 133.9 Ft., white	67	19		SPT Sampler 136.5	36 38 50	88
				55	20		SPT Sampler 135.0	22 22 18	40
			From El. 133.9 to 132.7 Ft., some angular to subangular fine to coarse gravel-sized limestone	67	21		SPT Sampler 133.5	11 13 14	27
			From El. 132.7 to 130.0 Ft., little angular to subangular fine gravel-sized limestone	55	22		SPT Sampler 132.0	25 15 12	27
				55	23		SPT Sampler 130.5	18 20 26	46
130.0	35.0			89	24		SPT Sampler	20	

15 20 25 30 35

SAJ FORM 1836-A
JUN 02

(Continued)

Boring Designation CB-BA2-1

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District			SHEET 3 OF 3 SHEETS
PROJECT Arecibo River, PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29	
LOCATION COORDINATES X = 397,078 Y = 225,303	ELEVATION TOP OF BORING 165.0 Ft.			

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
			SAND, silty (SAPROLITIC LIMESTONE), mostly angular to subangular fine to coarse-grained sand-sized limestone, little fine to coarse gravel-sized limestone, strong reaction with HCl, dry, moderate cementation, homogeneous, white (SM)	89	24		SPT Sampler 129.0	44 49	93
			From El. 128.0 to 125.6 Ft., pale yellow	67	25		SPT Sampler 127.5	41 31 22	53
				78	26		SPT Sampler 126.0	30 21 30	51
124.5	40.5		From El. 125.6 to 124.5 Ft., white	89	27		SPT Sampler 124.5	25 13 14	27
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System.				140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).		

Depth scale: 35, 40, 45, 50, 55

Boring Designation CB-BA2-2

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 3 SHEETS

1. PROJECT: Arecibo River, PR / Alternate Borrow Area (South of PR-22)	9. SIZE AND TYPE OF BIT: See Remarks
	10. COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.); HORIZONTAL: NAD27; VERTICAL: NGVD29
2. BORING DESIGNATION: CB-BA2-2; LOCATION COORDINATES: X = 398,135 Y = 225,494	11. MANUFACTURER'S DESIGNATION OF DRILL: CME-45C; ☐ AUTO HAMMER ☒ MANUAL HAMMER
3. DRILLING AGENCY: Geoconsult Inc.; CONTRACTOR FILE NO.: 3006-03	12. TOTAL SAMPLES: DISTURBED 27; UNDISTURBED (UD) 0
4. NAME OF DRILLER: STEVEN PEREZ	13. TOTAL NUMBER CORE BOXES: 2
	14. ELEVATION GROUND WATER: Not Encountered
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED; DEG. FROM VERTICAL: ; BEARING:	15. DATE BORING: STARTED 08-13-03; COMPLETED 08-14-03
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: 159.0 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: 87 %
8. TOTAL DEPTH OF BORING: 40.5 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Bernard J. Seifert, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
159.0	0.0						159.0		
			SAND, silty (SAPROLITIC LIMESTONE), mostly angular to subangular fine to medium-grained sand-sized limestone, some angular coarse gravel-sized limestone, strong reaction with HCl, dry, weak cementation, homogeneous, white (SM)	100	1		SPT Sampler; 157.5	50 / 33 / 30	63
157.0	2.0		GRAVEL, clayey (SAPROLITIC LIMESTONE), mostly angular fine gravel-sized limestone, little angular to subangular fine to medium-grained sand-sized limestone, strong reaction with HCl, dry, weak cementation, homogeneous, very pale brown (GC)	54	2		SPT Sampler; 156.6	18 / 50/0.4'	
							Advanced Boring w/ hollow stem auger; 156.0		
				100	3		SPT Sampler; 154.5	38 / 30 / 19	49
154.4	4.7		SAND, silty (SAPROLITIC LIMESTONE), mostly angular fine to medium-grained sand-sized limestone, few subangular fine gravel-sized limestone, strong reaction with HCl, dry, weak cementation, homogeneous, white (SM)	67	4		SPT Sampler; 153.0	7 / 10 / 19	29
152.4	6.7		SILT, inorganic-L (SAPROLITIC LIMESTONE), nonplastic, hard, some angular to subangular fine to medium-grained sand-sized limestone, few subangular fine gravel-sized limestone, strong reaction with HCl, dry, weak cementation, homogeneous, white (ML)	100	5		SPT Sampler; 151.5	14 / 10 / 10	20
				100	6		SPT Sampler; 150.0	24 / 29 / 20	49
			From El. 150.2 to 148.1 Ft., few subangular fine gravel-sized limestone	100	7		SPT Sampler; 148.5	8 / 8 / 22	30
148.1	10.9		SAND, silty (SAPROLITIC LIMESTONE), mostly angular to subangular fine to medium-grained sand-sized limestone, few subangular fine to coarse gravel-sized limestone, strong reaction with HCl, dry, weak cementation, homogeneous, white (SM)	100	8		SPT Sampler; 147.0	27 / 20 / 13	33
				100	9		SPT Sampler; 145.5	36 / 42 / 25	67
				100	10		SPT Sampler; 144.0	38 / 40 / 25	65
144.5	14.5		SILT, inorganic-L (SAPROLITIC LIMESTONE),						

Depth scale: 0, 5, 10, 15

(Continued)

SAJ FORM 1836
JUN 02

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District		SHEET 2 OF 3 SHEETS
PROJECT Arecibo River, PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29
LOCATION COORDINATES X = 398,135 Y = 225,494	ELEVATION TOP OF BORING 159.0 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
			nonplastic, hard, some angular fine to medium-grained sand-sized limestone, few subangular fine gravel-sized limestone, strong reaction with HCl, dry, weak cementation, homogeneous, white (ML)	100	11		142.5 SPT Sampler	31 24 19	43
				100	12		141.0 SPT Sampler	32 30 24	54
140.2	18.8		SAND, silty (SAPROLITIC LIMESTONE), mostly angular to subangular fine to medium-grained sand-sized limestone, few angular to subangular fine to coarse gravel-sized limestone, strong reaction with HCl, dry, weak cementation, homogeneous, white (SM)	100	13		139.5 SPT Sampler	27 35 49	84
				100	14		139.1 SPT Sampler	50/0.4'	
							138.0 Advanced Boring w/ hollow stem auger		
138.1	20.9		GRAVEL, silty (SAPROLITIC LIMESTONE), mostly angular fine gravel-sized limestone, little angular to subangular medium to coarse-grained sand-sized limestone, strong reaction with HCl, dry, weak cementation, homogeneous, white (GM)	79	15		137.6 SPT Sampler	50/0.4'	
							136.5 Advanced Boring w/ hollow stem auger		
135.7	23.3		SAND, silty (SAPROLITIC LIMESTONE), mostly angular to subangular fine to medium-grained sand-sized limestone, little subangular fine gravel-sized limestone, strong reaction with HCl, dry, weak cementation, homogeneous, white (SM)	22	16		135.0 SPT Sampler	15 14 7	21
				83	17		133.5 SPT Sampler	24 12 14	26
			From El. 133.4 to 131.9 Ft., little angular to subangular coarse gravel-sized limestone	100	18		132.0 SPT Sampler	25 13 5	18
			From El. 131.9 to 128.8 Ft., little angular fine gravel-sized limestone, weak cementation	100	19		131.7 SPT Sampler	50/0.3'	
							130.5 Advanced Boring w/ hollow stem auger		
				79	20		130.1 SPT Sampler	50/0.4'	
							129.0 Advanced Boring w/ hollow stem auger		
			From El. 128.8 to 127.6 Ft., little angular to subangular fine to coarse gravel-sized limestone	79	21		128.6 SPT Sampler	50/0.4'	
							127.5 Advanced Boring w/ hollow stem auger		
127.6	31.4		SAND, poorly-graded (SAPROLITIC LIMESTONE), mostly angular to subangular coarse gravel-sized limestone, strong reaction with HCl, dry, weak cementation, homogeneous, white (SP)	76	22		127.2 SPT Sampler	50/0.3'	
							126.0 Advanced Boring w/ hollow stem auger		
125.6	33.4		SAND, silty (SAPROLITIC LIMESTONE), mostly angular fine to medium-grained sand-sized limestone, few angular to subangular fine to coarse gravel-sized limestone, strong reaction with HCl, dry, weak	67	23		124.5 SPT Sampler	15 26 30	56
				83	24		SPT Sampler	34	

Depth scale: 15, 20, 25, 30, 35

SAJ FORM 1836-A
JUN 02

(Continued)

Boring Designation CB-BA2-2

DRILLING LOG (Cont. Sheet)	INSTALLATION: Jacksonville District		SHEET 3 OF 3 SHEETS
PROJECT: Arecibo River, PR	COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.)	HORIZONTAL: NAD27	VERTICAL: NGVD29
LOCATION COORDINATES: X = 398,135 Y = 225,494	ELEVATION TOP OF BORING: 159.0 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
			cementation, homogeneous, white (SM)	83	24		SPT Sampler 123.0	30 / 25	55
			From El. 123.0 to 119.0 Ft., some angular fine to coarse gravel-sized limestone	83	25		SPT Sampler 121.5	45 / 34 / 17	51
				83	26		SPT Sampler 120.0	15 / 20 / 17	37
118.5	40.5		From El. 119.0 to 118.5 Ft., weak cementation, very pale brown	83	27		SPT Sampler 118.5	21 / 24 / 40	64

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).

Abbreviations:

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DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 3 SHEETS

1. PROJECT: Arecibo River, PR Alternate Borrow Area (South of PR-22)	9. SIZE AND TYPE OF BIT: See Remarks 10. COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.) — HORIZONTAL: NAD27 — VERTICAL: NGVD29
2. BORING DESIGNATION: CB-BA2-3 — LOCATION COORDINATES: X = 397,195 Y = 224,342	11. MANUFACTURER'S DESIGNATION OF DRILL: CME-45B — ☐ AUTO HAMMER ☒ MANUAL HAMMER
3. DRILLING AGENCY: Geoconsult Inc. — CONTRACTOR FILE NO.: 3006-03	12. TOTAL SAMPLES: DISTURBED 27 — UNDISTURBED (UD) 0
4. NAME OF DRILLER: CARLOS ROSA	13. TOTAL NUMBER CORE BOXES: 2 14. ELEVATION GROUND WATER: Not Encountered
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED — DEG. FROM VERTICAL: — BEARING:	15. DATE BORING: STARTED 08-15-03 — COMPLETED 08-20-03
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: 200.2 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: 60 %
8. TOTAL DEPTH OF BORING: 40.5 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Bernard J. Seifert, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
200.2	0.0						200.2		
			SAND, silty (SAPROLITIC LIMESTONE), mostly angular fine to medium-grained sand-sized limestone, some angular to subangular fine to coarse gravel-sized limestone, strong reaction with HCl, dry, weak cementation, homogeneous, white (SM)	67	1		SPT Sampler 198.7	9 10 16	26
			From El. 198.2 to 196.2 Ft., little subangular fine gravel-sized limestone	55	2		SPT Sampler 197.2	22 19 18	37
			From El. 196.2 to 195.0 Ft., little subangular fine to coarse gravel-sized limestone	89	3		SPT Sampler 195.7	22 38 40	78
			From El. 195.0 to 192.2 Ft., some angular to subangular fine to coarse gravel-sized limestone	67	4		SPT Sampler 194.2	25 40 45	85
				55	5		SPT Sampler 192.7	20 25 30	55
192.2	8.0		SAND, well-graded (SAPROLITIC LIMESTONE), mostly angular fine to coarse-grained limestone, little angular fine to coarse gravel-sized limestone, few silt, strong reaction with HCl, dry, weak cementation, homogeneous, white (SW)	55	6		SPT Sampler 191.2	19 36 30	66
				78	7		SPT Sampler 189.7	35 40 42	82
			From El. 189.0 to 184.6 Ft., some angular fine to coarse gravel-sized limestone, very pale brown	55	8		SPT Sampler 188.2	36 38 26	64
				67	9		SPT Sampler 186.7	27 30 35	65
				78	10		SPT Sampler 185.2	32 38 38	76

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SAJ FORM 1836
JUN 02

(Continued)

DRILLING LOG (Cont. Sheet)	**INSTALLATION** Jacksonville District		**SHEET** 2 **OF** 3 **SHEETS**
PROJECT Arecibo River, PR	**COORDINATE SYSTEM/DATUM** State Plane, PR/VI (U.S. Ft.)	**HORIZONTAL** NAD27	**VERTICAL** NGVD29
LOCATION COORDINATES X = 397,195 Y = 224,342	**ELEVATION TOP OF BORING** 200.2 Ft.		

ELEV.	DEPTH	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
		From El. 184.6 to 183.6 Ft., mostly angular fine to medium-grained sand-sized limestone, trace subangular coarse gravel-sized limestone	60	11		SPT Sampler 184.3	50 50/0.3'	
183.6	16.6					Advanced Boring w/ hollow stem auger 183.7		
		SAND, silty (SAPROLITIC LIMESTONE), mostly angular to subangular fine to medium-grained sand-sized limestone, some angular to subangular fine to coarse gravel-sized limestone, strong reaction with HCl, dry, moderate cementation, homogeneous, white	100	12		SPT Sampler 183.5	50/0.2'	
182.1	18.1					Advanced Boring w/ hollow stem auger 182.2		
		GRAVEL, well-graded (SAPROLITIC LIMESTONE), mostly angular to subangular fine to coarse gravel-sized limestone, little angular to subangular fine to medium-grained sand-sized limestone, strong reaction with HCl, dry, weak cementation, homogeneous, white (GW)	100	13		SPT Sampler 181.9	50/0.3'	
						Advanced Boring w/ hollow stem auger 180.7		
			68	14		SPT Sampler 180.4	50/0.3'	
						Advanced Boring w/ hollow stem auger 179.2		
			100	15		SPT Sampler 179.0	50/0.2'	
						Advanced Boring w/ hollow stem auger 177.7		
			100	16		SPT Sampler 177.4	50/0.3'	
176.0	24.2					Advanced Boring w/ hollow stem auger 176.2		
		SILT, inorganic-L (SAPROLITIC LIMESTONE), nonplastic, hard, some angular fine to medium-grained sand-sized limestone, few angular to subangular fine to coarse gravel-sized limestone, strong reaction with HCl, dry, homogeneous, white (ML)	67	17		SPT Sampler 174.7	26 19 16	35
		From El. 174.2 to 173.1 Ft., discontinue angular to subangular fine to coarse gravel-sized limestone	78	18		SPT Sampler 173.2	27 16 14	30
171.4	28.8	From El. 173.1 to 171.4 Ft., little subangular fine to coarse gravel-sized limestone	89	19		SPT Sampler 171.7	42 24 50	74
		SAND, silty (SAPROLITIC LIMESTONE), mostly angular to subangular fine to medium-grained sand-sized limestone, few subangular fine gravel-sized limestone, strong reaction with HCl, dry, weak cementation, homogeneous, white (SM)	17	20		SPT Sampler 170.2	50 50	
		From El. 169.2 to 165.7 Ft., some angular to subangular fine to coarse gravel-sized limestone	78	21		SPT Sampler 168.7	28 31 40	71
			55	22		SPT Sampler 167.2	30 27 32	59
165.7	34.4		78	23		SPT Sampler 165.7	47 28 50	78
		GRAVEL, poorly-graded (SAPROLITIC LIMESTONE), mostly angular coarse	11	24		SPT Sampler	50	

Depth scale: 15, 20, 25, 30, 35

(Continued)

Boring Designation CB-BA2-3

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District	SHEET 3 OF 3 SHEETS
PROJECT Arecibo River, PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.) ¦ HORIZONTAL NAD27 ¦ VERTICAL NGVD29	
LOCATION COORDINATES X = 397,195 Y = 224,342	ELEVATION TOP OF BORING 200.2 Ft.	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
			gravel-sized limestone, strong reaction with HCl, dry, weak cementation, homogeneous, white (GP)	11	24		SPT Sampler 164.2		
163.7	36.4		SILT, inorganic-H (SAPROLITIC LIMESTONE), nonplastic, hard, little angular fine to medium-grained sand-sized limestone, little angular to subangular fine to coarse gravel-sized limestone, strong reaction with HCl, dry, homogeneous, white (MH)	55	25		SPT Sampler 162.7	50 50 50	
162.2	37.9		SAND, well-graded (SAPROLITIC LIMESTONE), mostly angular to subangular fine to coarse-grained sand-sized limestone, little angular fine gravel-sized limestone, strong reaction with HCl, dry, weak cementation, homogeneous, white (SW)	28	26		SPT Sampler 161.2	30 50	
				11	27		SPT Sampler 159.7	50	
159.7	40.5								
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System.				140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.). Abbreviations:		

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Boring Designation CB-DC-12

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 4 SHEETS

1. PROJECT: Arecibo River, PR Diversion Channel	9. SIZE AND TYPE OF BIT: See Remarks
	10. COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.); HORIZONTAL: NAD27; VERTICAL: NGVD29
2. BORING DESIGNATION: CB-DC-12; LOCATION COORDINATES: X = 401,446 Y = 223,711	11. MANUFACTURER'S DESIGNATION OF DRILL: CME-45C; ☐ AUTO HAMMER ☒ MANUAL HAMMER
3. DRILLING AGENCY: Geoconsult Inc.; CONTRACTOR FILE NO.: 3006-03	12. TOTAL SAMPLES: DISTURBED 40; UNDISTURBED (UD) 0
4. NAME OF DRILLER: STEVEN PEREZ	13. TOTAL NUMBER CORE BOXES: 2
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED; DEG. FROM VERTICAL:; BEARING:	14. ELEVATION GROUND WATER: 9.7 Ft. measured after 24 hrs.
	15. DATE BORING: STARTED 08-08-03; COMPLETED 08-11-03
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: 18.7 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: 92 %
8. TOTAL DEPTH OF BORING: 60.0 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Jorge I. Wichy, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
18.7	0.0						18.7		
17.4	1.3		CLAY, lean, medium plasticity, firm, few plant debris, no reaction with HCl, dry, homogeneous, dark yellowish brown (CL)	100	1		SPT Sampler 17.2	3 / 5 / 5	10
			CLAY, fat, high plasticity, firm, no reaction with HCl, dry, homogeneous, oxidation stains, yellowish brown (CH) From El. 16.1 to 12.4 Ft., moist	33	2		SPT Sampler 15.7	5 / 7 / 8	15
				67	3		SPT Sampler 14.2	6 / 6 / 6	12
				100	4		SPT Sampler 12.7	3 / 3 / 4	7
			From El. 12.4 to 10.9 Ft., hard, dry, grayish brown	33	5		SPT Sampler 11.2	4 / 6 / 6	12
			From El. 10.9 to 9.7 Ft., firm, moist, reddish yellow	100	6		SPT Sampler 9.7	6 / 4 / 4	8
			From El. 9.7 to 8.3 Ft., soft, little subangular fine-grained sand-sized alluvial deposit, wet	100	7		SPT Sampler 8.2	2 / 2 / 3	5
			From El. 8.3 to -1.2 Ft., few subangular fine-grained sand-sized alluvial deposit	100	8		SPT Sampler 6.7	3 / 3 / 3	6
				100	9		SPT Sampler 5.2	4 / 4 / 4	8
				100	10		SPT Sampler 3.7	1 / 2 / 1	3

Depth scale: 0, 5, 10, 15

SAJ FORM 1836
JUN 02

(Continued)

Boring Designation CB-DC-12

DRILLING LOG (Cont. Sheet)

INSTALLATION	SHEET 2 OF 4 SHEETS
Jacksonville District	

PROJECT	COORDINATE SYSTEM/DATUM	HORIZONTAL	VERTICAL
Arecibo River, PR	State Plane, PR/VI (U.S. Ft.)	NAD27	NGVD29

LOCATION COORDINATES	ELEVATION TOP OF BORING
X = 401,446 Y = 223,711	18.7 Ft.

ELEV.	DEPTH	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
			67	11		SPT Sampler 2.2	1 / 2 / 2	4
			100	12		SPT Sampler 0.7	2 / 2 / 2	4
			100	13		SPT Sampler -0.8	3 / 4 / 4	8
		From El. -1.2 to -5.8 Ft., gray	100	14		SPT Sampler -2.3	2 / 3 / 3	6
			100	15		SPT Sampler -3.8	3 / 3 / 2	5
			45	16		SPT Sampler -5.3	2 / 1 / 2	3
		From El. -5.8 to -7.7 Ft., trace plant debris	100	17		SPT Sampler -6.8	2 / 1 / 2	3
-8.6	27.3	From El. -7.7 to -8.6 Ft., medium plasticity, some subangular fine-grained sand-sized alluvial deposit, dark gray	100	18		SPT Sampler -8.3	1 / 3 / 5	8
-11.1	29.8	SAND, poorly-graded with silt, mostly subangular medium-grained sand-sized alluvial deposit, no reaction with HCl, wet, weak cementation, homogeneous, dark gray (SP-SM)	100	19		SPT Sampler -9.8	3 / 5 / 4	9
			67	20		SPT Sampler -11.3	6 / 8 / 6	14
		CLAY, fat, high plasticity, soft, few subangular fine-grained sand-sized alluvial deposit, no reaction with HCl, wet, homogeneous, dark gray (CH)	100	21		SPT Sampler -12.8	3 / 1 / 1	2
			100	22		SPT Sampler -14.3	1 / 1 / 1	2
		From El. -15.3 to -15.8 Ft., little plant debris	100	23		SPT Sampler -15.8	WOH / WOH / 2	2
		From El. -15.8 to -17.3 Ft., very soft, trace plant	100	24		SPT Sampler	WOH	

Depth scale: 15, 20, 25, 30, 35

(Continued)

SAJ FORM 1836-A
JUN 02

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District		SHEET 3 OF 4 SHEETS
PROJECT Arecibo River, PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29
LOCATION COORDINATES X = 401,446 Y = 223,711	ELEVATION TOP OF BORING 18.7 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
			debris	100	24		SPT Sampler -17.3	WOH / WOH	0
			From El. -17.3 to -28.0 Ft., discontinue plant debris	100	25		SPT Sampler -18.8	WOH / WOH / WOH	0
				100	26		SPT Sampler -20.3	WOH / 1 / 1	2
				100	27		SPT Sampler -21.8	2 / 1 / 2	3
				100	28		SPT Sampler -23.3	2 / 2 / 2	4
				100	29		SPT Sampler -24.8	3 / 3 / 2	5
				100	30		SPT Sampler -26.3	2 / 3 / 3	6
				67	31		SPT Sampler -27.8	WOH / WOH / WOH	0
			From El. -28.0 to -30.6 Ft., few plant debris	100	32		SPT Sampler -29.3	2 / 2 / 2	4
-30.6	49.3			100	33		SPT Sampler -30.8	2 / 3 / 2	5
			SILT, inorganic-L, nonplastic, soft, few subangular fine-grained sand-sized alluvial deposit, few plant debris, no reaction with HCl, wet, homogeneous, dark gray (ML)	100	34		SPT Sampler -32.3	3 / 2 / 3	5
-33.1	51.8		CLAY, fat, high plasticity, soft, little subangular fine-grained sand-sized alluvial deposit, few plant debris, no reaction with HCl, wet, homogeneous, dark gray (CH)	100	35		SPT Sampler -33.8	1 / 1 / 2	3
				100	36		SPT Sampler -35.3	1 / 2 / 3	5
			From El. -35.3 to -38.1 Ft., few subangular fine-grained sand-sized alluvial deposit	100	37		SPT Sampler	1 / 2	

Depth scale: 35, 40, 45, 50, 55

SAJ FORM 1836-A
JUN 02

(Continued)

Boring Designation CB-DC-12

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District		SHEET 4 OF 4 SHEETS
PROJECT Arecibo River, PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29
LOCATION COORDINATES X = 401,446 Y = 223,711	ELEVATION TOP OF BORING 18.7 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
				100	37		-36.8 SPT Sampler	2	4
			From El. -38.1 to -41.3 Ft., trace subangular fine-grained sand-sized alluvial deposit, trace plant debris, dark grayish brown	100	38		SPT Sampler -38.3	3 3 3	6
				100	39		SPT Sampler -39.8	3 3 3	6
-41.3	60.0			100	40		SPT Sampler -41.3	4 4 4	8

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
10	13.5/15.0	
17	24.0/25.5	
22	31.5/33.0	
27	39.0/40.5	

3. Additional Laboratory Testing

4 Moisture Content
10 Moisture Content
12 Moisture Content
17 Moisture Content
22 Moisture Content
27 Moisture Content
32 Moisture Content
36 Moisture Content

140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).

Abbreviations:
WOH = Weight of Hammer.

55 60 65 70 75

SAJ FORM 1836-A
JUN 02

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 4 SHEETS

1. PROJECT	Arecibo River, PR Diversion Channel
2. BORING DESIGNATION	CB-DC-13
LOCATION COORDINATES	X = 401,760 Y = 223,800
3. DRILLING AGENCY	Geoconsult Inc.
CONTRACTOR FILE NO.	3006-03
4. NAME OF DRILLER	CARLOS ROSA
5. DIRECTION OF BORING	☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL	
BEARING	
6. THICKNESS OF OVERBURDEN	0.0 Ft.
7. DEPTH DRILLED INTO ROCK	0.0 Ft.
8. TOTAL DEPTH OF BORING	60.0 Ft.
9. SIZE AND TYPE OF BIT	See Remarks
10. COORDINATE SYSTEM/DATUM	State Plane, PR/VI (U.S. Ft.); HORIZONTAL: NAD27; VERTICAL: NGVD29
11. MANUFACTURER'S DESIGNATION OF DRILL	CME-45B; ☐ AUTO HAMMER ☒ MANUAL HAMMER
12. TOTAL SAMPLES	DISTURBED: 40; UNDISTURBED (UD): 0
13. TOTAL NUMBER CORE BOXES	2
14. ELEVATION GROUND WATER	8.8 Ft. measured after 24 hrs.
15. DATE BORING	STARTED: 08-07-03; COMPLETED: 08-08-03
16. ELEVATION TOP OF BORING	16.8 Ft.
17. TOTAL RECOVERY FOR BORING	76 %
18. SIGNATURE AND TITLE OF INSPECTOR	Jorge I. Wichy, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
16.8	0.0						16.8		
			CLAY, lean, medium plasticity, firm, trace plant debris, no reaction with HCl, dry, homogeneous, dark yellowish brown (CL)	100	1		SPT Sampler 15.3	5 5 6	11
14.1	2.8			67	2		SPT Sampler 13.8	4 5 6	11
			CLAY, fat, high plasticity, firm, no reaction with HCl, dry, homogeneous, oxidation stains, yellowish brown (CH)	78	3		SPT Sampler 12.3	4 4 4	8
			From El. 11.8 to 8.7 Ft., moist, gray mottled, reddish yellow	89	4		SPT Sampler 10.8	3 2 3	5
				33	5		SPT Sampler 9.3	3 2 2	4
			From El. 8.7 to 7.6 Ft., soft, wet	55	6		SPT Sampler 7.8	2 1 1	2
			From El. 7.6 to 5.5 Ft., little subangular fine-grained sand-sized alluvial deposit	45	7		SPT Sampler 6.3	2 2 2	4
			From El. 5.5 to 5.3 Ft., some subangular fine-grained sand-sized alluvial deposit	89	8		SPT Sampler 4.8	WOH WOH 2	2
			From El. 4.6 to 1.2 Ft., few subangular fine-grained sand-sized alluvial deposit	55	9		SPT Sampler 3.3	2 2 2	4
				89	10		SPT Sampler 1.8	2 2 2	4

(Continued)

Boring Designation CB-DC-13

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District		SHEET 2 OF 4 SHEETS
PROJECT Arecibo River, PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29
LOCATION COORDINATES X = 401,760 Y = 223,800	ELEVATION TOP OF BORING 16.8 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
			From El. 1.2 to -0.3 Ft., little subangular fine-grained sand-sized alluvial deposit	67	11		SPT Sampler 0.3	1 / 4 / 6	10
-0.3	17.2		SAND, clayey, mostly subangular fine to medium-grained sand-sized alluvial deposit, no reaction with HCl, wet, weak cementation, homogeneous, yellowish brown (SC)	89	12		SPT Sampler -1.2	2 / 6 / 8	14
				67	13		SPT Sampler -2.7	3 / 3 / 6	9
			From El. -4.0 to -6.4 Ft., dark gray	78	14		SPT Sampler -4.2	5 / 5 / 3	8
				89	15		SPT Sampler -5.7	5 / 8 / 8	16
-6.4	23.3		SAND, well-graded, mostly subangular to subrounded fine to coarse-grained sand-sized alluvial deposit, few clay, no reaction with HCl, wet, weak cementation, homogeneous, dark gray (SW)	67	16		SPT Sampler -7.2	7 / 6 / 1	7
				78	17		SPT Sampler -8.7	3 / 5 / 4	9
-8.8	25.7		SAND, clayey, mostly subangular fine to medium-grained sand-sized alluvial deposit, no reaction with HCl, wet, weak cementation, homogeneous, dark gray (SC)	78	18		SPT Sampler -10.2	1 / 1 / 1	2
-10.7	27.6		CLAY, fat, high plasticity, soft, little subangular fine-grained sand-sized alluvial deposit, no reaction with HCl, wet, homogeneous, dark gray (CH)	89	19		SPT Sampler -11.7	1 / 2 / 3	5
				78	20		SPT Sampler -13.2	2 / 1 / 2	3
				78	21		SPT Sampler -14.7	3 / 2 / 3	5
			From El. -15.2 to -22.5 Ft., few subangular fine-grained sand-sized alluvial deposit, trace plant debris	67	22		SPT Sampler -16.2	3 / 2 / 2	4
				78	23		SPT Sampler -17.7	WOR / WOR / 2	2
				55	24		SPT Sampler	WOH	

Depth scale: 15, 20, 25, 30, 35

(Continued)

Boring Designation CB-DC-13

DRILLING LOG (Cont. Sheet)	INSTALLATION: Jacksonville District		SHEET 3 OF 4 SHEETS
PROJECT: Arecibo River, PR	COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.)	HORIZONTAL: NAD27	VERTICAL: NGVD29
LOCATION COORDINATES: X = 401,760 Y = 223,800	ELEVATION TOP OF BORING: 16.8 Ft.		

ELEV.	DEPTH	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
			55	24		SPT Sampler -19.2	WOH, 2	2
			78	25		SPT Sampler -20.7	4, 2, 3	5
			89	26		SPT Sampler -22.2	2, 2, 1	3
		From El. -22.5 to -23.7 Ft., little subangular fine-grained sand-sized alluvial deposit, discontinue plant debris	78	27		SPT Sampler -23.7	2, 2, 2	4
		From El. -23.7 to -25.9 Ft., very soft, few subangular fine-grained sand-sized alluvial deposit	55	28		SPT Sampler -25.2	2, 3, 2	5
		From El. -25.9 to -27.6 Ft., soft, few subangular fine to medium-grained sand-sized alluvial deposit, trace plant debris	89	29		SPT Sampler -26.7	3, 5, 5	10
-27.6	44.4		78	30		SPT Sampler -28.2	5, 10, 9	19
		SAND, clayey, mostly angular to subangular fine to coarse-grained sand-sized alluvial deposit, few subangular to subrounded fine gravel-sized alluvial deposit, no reaction with HCl, moist, weak cementation, homogeneous, dark olive gray (SC)	89	31		SPT Sampler -29.7	10, 23, 25	48
-31.2	48.0		55	32		SPT Sampler -31.2	17, 23, 24	47
-33.2	50.1	SAND, poorly-graded with clay, mostly subangular medium-grained sand-sized alluvial deposit, no reaction with HCl, wet, weak cementation, homogeneous, dark olive gray (SP-SC)	78	33		SPT Sampler -32.7	9, 19, 10	29
		CLAY, fat, high plasticity, firm, little angular medium-grained sand-sized alluvial deposit, trace angular fine gravel-sized alluvial deposit, no reaction with HCl, moist, homogeneous, olive gray (CH)	89	34		SPT Sampler -34.2	8, 12, 12	24
		From El. -34.8 to -39.4 Ft., little subangular fine-grained sand-sized alluvial deposit	78	35		SPT Sampler -35.7	8, 9, 10	19
			67	36		SPT Sampler -37.2	9, 10, 11	21
			78	37		SPT Sampler	10, 9	

Depth scale: 35, 40, 45, 50, 55

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District		SHEET 4 OF 4 SHEETS
PROJECT Arecibo River, PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29
LOCATION COORDINATES X = 401,760 Y = 223,800	ELEVATION TOP OF BORING 16.8 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
				78	37		-38.7 SPT Sampler	10	19
			From El. -39.4 to -42.3 Ft., trace subangular fine-grained sand-sized alluvial deposit, light olive brown mottled	100	38		SPT Sampler -40.2	9 / 10 / 13	23
				100	39		SPT Sampler -41.7	10 / 12 / 14	26
-43.2	60.0		From El. -42.3 to -43.2 Ft., hard	100	40		SPT Sampler -43.2	8 / 17 / 21	38

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
8	10.5/12.0	
14	19.5/21.0	
23	33.0/34.5	
28	40.5/42.0	
31	45.0/46.5	

3. Additional Laboratory Testing

3 Moisture Content
8 Moisture Content
14 Moisture Content
20 Moisture Content
23 Moisture Content
26 Moisture Content
28 Moisture Content
31 Moisture Content

140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).

Abbreviations:
WOR = Weight of Rods.
WOH = Weight of Hammer.

55 60 65 70 75

Boring Designation CB-DC-14

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT: Arecibo River, PR Diversion Channel	9. SIZE AND TYPE OF BIT: See Remarks
	10. COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.); HORIZONTAL: NAD27; VERTICAL: NGVD29
2. BORING DESIGNATION: CB-DC-14; LOCATION COORDINATES: X = 402,895 Y = 223,665	11. MANUFACTURER'S DESIGNATION OF DRILL: CME-45B; ☐ AUTO HAMMER ☒ MANUAL HAMMER
3. DRILLING AGENCY: Geoconsult Inc.; CONTRACTOR FILE NO.: 3006-03	12. TOTAL SAMPLES: DISTURBED 14; UNDISTURBED (UD) 0
4. NAME OF DRILLER: CARLOS ROSA	13. TOTAL NUMBER CORE BOXES: 1
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED; DEG. FROM VERTICAL: ; BEARING:	14. ELEVATION GROUND WATER: 6.9 Ft. measured after 24 hrs.
	15. DATE BORING: STARTED 08-06-03; COMPLETED 08-06-03
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: 21.9 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: 84 %
8. TOTAL DEPTH OF BORING: 21.0 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Jorge I. Wichy, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
21.9	0.0						21.9		
			CLAY, lean, low plasticity, firm, few subangular fine-grained sand-sized alluvial deposit, few plant debris, no reaction with HCl, dry, homogeneous, dark yellowish brown (CL) From El. 20.7 to 18.3 Ft., trace plant debris, yellowish brown	55	1		SPT Sampler 20.4	6 / 8 / 8	16
				67	2		SPT Sampler 18.9	5 / 7 / 7	14
			From El. 18.3 to 13.9 Ft., trace subangular fine-grained sand-sized alluvial deposit	89	3		SPT Sampler 17.4	6 / 7 / 7	14
				78	4		SPT Sampler 15.9	4 / 7 / 7	14
				89	5		SPT Sampler 14.4	9 / 9 / 11	20
13.9	8.0		SAND, poorly-graded with clay, mostly subangular medium-grained sand-sized alluvial deposit, no reaction with HCl, dry, weak cementation, homogeneous, yellowish brown (SP-SC)	78	6		SPT Sampler 12.9	4 / 6 / 5	11
			From El. 12.2 to 10.5 Ft., few subangular fine-grained sand-sized alluvial deposit, lensed with yellowish brown sandy lean clay	89	7		SPT Sampler 11.4	4 / 3 / 3	6
10.5	11.3		CLAY, fat, high plasticity, firm, no reaction with HCl, moist, homogeneous, brown mottled, reddish brown (CH)	78	8		SPT Sampler 9.9	2 / 2 / 2	4
				89	9		SPT Sampler 8.4	2 / 3 / 4	7
				89	10		SPT Sampler 6.9	2 / 3 / 3	6

Depth scale: 0, 5, 10, 15

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DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District		SHEET 2 OF 2 SHEETS
PROJECT Arecibo River, PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29
LOCATION COORDINATES X = 402,895 Y = 223,665	ELEVATION TOP OF BORING 21.9 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
			From El. 6.7 to 1.9 Ft., soft, oxidation stains, yellowish brown	100	11		SPT Sampler 5.4	2 2 2	4
				83	12		SPT Sampler 3.9	2 2 3	5
				89	13		SPT Sampler 2.4	WOH 1 2	3
0.9	21.0		From El. 1.4 to 1.2 Ft., lensed with gray poorly graded sand with clay From El. 1.2 to 0.9 Ft., gray	100	14		SPT Sampler 0.9	3 3 4	7

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
3	3.0/4.5	
7	9.0/10.5	
11	15.0/16.5	

3. Additional Laboratory Testing

3 Moisture Content
7 Moisture Content
9 Moisture Content
11 Moisture Content

140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).

Abbreviations:
WOH = Weight of Hammer.

15 20 25 30 35

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT: Arecibo River, PR Diversion Channel	9. SIZE AND TYPE OF BIT: See Remarks
	10. COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.); HORIZONTAL: NAD27; VERTICAL: NGVD29
2. BORING DESIGNATION: CB-DC-15; LOCATION COORDINATES: X = 404,041 Y = 223,789	11. MANUFACTURER'S DESIGNATION OF DRILL: CME-45C; ☐ AUTO HAMMER ☒ MANUAL HAMMER
3. DRILLING AGENCY: Geoconsult Inc.; CONTRACTOR FILE NO.: 3006-03	12. TOTAL SAMPLES: DISTURBED 14; UNDISTURBED (UD) 0
4. NAME OF DRILLER: STEVEN PEREZ	13. TOTAL NUMBER CORE BOXES: 2
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED; DEG. FROM VERTICAL:; BEARING:	14. ELEVATION GROUND WATER: 8.7 Ft. measured after 24 hrs.
	15. DATE BORING: STARTED 08-06-03; COMPLETED 08-06-03
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: 17.7 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: 96 %
8. TOTAL DEPTH OF BORING: 21.0 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Jorge I. Wichy, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
17.7	0.0						17.7		
			CLAY, lean, low plasticity, firm, few subangular fine-grained sand-sized alluvial deposit, few plant debris, no reaction with HCl, dry, homogeneous, dark yellowish brown (CL)	100	1		SPT Sampler 16.2	4 / 5 / 6	11
			From El. 15.7 to 12.3 Ft., soft, little subangular fine-grained sand-sized alluvial deposit, yellowish brown	100	2		SPT Sampler 14.7	5 / 3 / 3	6
				100	3		SPT Sampler 13.2	3 / 2 / 1	3
			From El. 12.3 to 10.8 Ft., medium plasticity, few subangular fine-grained sand-sized alluvial deposit, moist, oxidation stains	100	4		SPT Sampler 11.7	2 / 3 / 3	6
			From El. 10.8 to 9.2 Ft., little subangular fine-grained sand-sized alluvial deposit	100	5		SPT Sampler 10.2	4 / 3 / 3	6
9.2	8.5			100	6		SPT Sampler 8.7	3 / 3 / 4	7
			SAND, poorly-graded with clay, mostly subangular fine-grained sand-sized alluvial deposit, no reaction with HCl, moist, weak cementation, homogeneous, yellowish brown (SP-SC) ▼ From El. 8.4 to 6.7 Ft., wet	100	7		SPT Sampler 7.2	3 / 2 / 2	4
6.7	11.0								
			SAND, poorly-graded with silt, mostly angular to subangular fine-grained sand-sized alluvial deposit, no reaction with HCl, wet, weak cementation, homogeneous, light gray (SP-SM)	100	8		SPT Sampler 5.7	2 / 1 / 1	2
				100	9		SPT Sampler 4.2	1 / 3 / 3	6
			From El. 3.7 to 2.4 Ft., mostly subangular medium-grained sand-sized alluvial deposit	67	10		SPT Sampler 2.7	4 / 4 / 3	7

(Continued)

Boring Designation CB-DC-15

DRILLING LOG (Cont. Sheet)	**INSTALLATION** Jacksonville District	**SHEET** 2 **OF** 2 **SHEETS**
PROJECT Arecibo River, PR	**COORDINATE SYSTEM/DATUM** State Plane, PR/VI (U.S. Ft.) · **HORIZONTAL** NAD27 · **VERTICAL** NGVD29	
LOCATION COORDINATES X = 404,041 Y = 223,789	**ELEVATION TOP OF BORING** 17.7 Ft.	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
			From El. 2.4 to 0.8 Ft., few subrounded to rounded fine gravel-sized alluvial deposit	83	11		SPT Sampler 1.2	4 / 4 / 4	8
0.8	16.8		SAND, well-graded, mostly subangular fine to coarse-grained sand-sized alluvial deposit, little subrounded fine gravel-sized alluvial deposit, few silt, no reaction with HCl, wet, weak cementation, homogeneous, gray (SW)	100	12		SPT Sampler -0.3	5 / 5 / 5	10
				100	13		SPT Sampler -1.8	7 / 8 / 7	15
-3.3	21.0			100	14		SPT Sampler -3.3	6 / 6 / 7	13

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
3	3.0/4.5	
7	9.0/10.5	
11	15.0/16.5	

3. Additional Laboratory Testing

3 Moisture Content
7 Moisture Content
11 Moisture Content

REMARKS: 140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).

15 20 25 30 35

Boring Designation CB-DC-16

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT: Arecibo River, PR Diversion Channel	9. SIZE AND TYPE OF BIT: See Remarks
	10. COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.); HORIZONTAL: NAD27; VERTICAL: NGVD29
2. BORING DESIGNATION: CB-DC-16; LOCATION COORDINATES: X = 404,211 Y = 225,082	11. MANUFACTURER'S DESIGNATION OF DRILL: CME-45C; ☐ AUTO HAMMER ☒ MANUAL HAMMER
3. DRILLING AGENCY: Geoconsult Inc.; CONTRACTOR FILE NO.: 3006-03	12. TOTAL SAMPLES: DISTURBED 14; UNDISTURBED (UD) 0
4. NAME OF DRILLER: STEVEN PEREZ	13. TOTAL NUMBER CORE BOXES: 1
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED; DEG. FROM VERTICAL: ; BEARING:	14. ELEVATION GROUND WATER: 0.8 Ft. measured after 24 hrs.
	15. DATE BORING: STARTED 08-07-03; COMPLETED 08-07-03
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: 9.8 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: 67 %
8. TOTAL DEPTH OF BORING: 21.0 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Jorge I. Wichy, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
9.8	0.0						9.8		
			CLAY, lean, low plasticity, firm, few subangular fine-grained sand-sized alluvial deposit, trace plant debris, no reaction with HCl, dry, homogeneous, dark yellowish brown (CL)	33	1		SPT Sampler 8.3	3 / 4 / 5	9
				33	2		SPT Sampler 6.8	4 / 3 / 4	7
6.3	3.5		From El. 7.0 to 6.3 Ft., little subangular fine-grained sand-sized alluvial deposit, yellowish brown	67	3		SPT Sampler 5.3	3 / 2 / 2	4
4.6	5.2		CLAY, fat, high plasticity, soft, no reaction with HCl, moist, homogeneous, reddish brown mottled, grayish brown (CH)						
			CLAY, lean, low plasticity, soft, no reaction with HCl, moist, homogeneous, reddish brown mottled, dark gray (CL)	100	4		SPT Sampler 3.8	1 / 0 / 1	1
			From El. 2.9 to 1.0 Ft., little subangular fine-grained sand-sized alluvial deposit, few plant debris	100	5		SPT Sampler 2.3	1 / 1 / 0	1
1.0	8.8			100	6		SPT Sampler 0.8	WOH / WOH / 6	6
			SAND, well-graded, mostly subangular medium to coarse-grained sand-sized alluvial deposit, little subrounded fine gravel-sized alluvial deposit, few silt, no reaction with HCl, wet, weak cementation, gray to dark gray (SW)	33	7		SPT Sampler -0.7	3 / 4 / 4	8
				33	8		SPT Sampler -2.2	4 / 4 / 3	7
-3.9	13.7			33	9		SPT Sampler -3.7	3 / 3 / 2	5
			SILT, inorganic-H, low plasticity, soft, little subangular fine-grained sand-sized alluvial deposit, no reaction with HCl, moist, homogeneous, dark gray (MH)	67	10		SPT Sampler -5.2	2 / 2 / 1	3

0 5 10 15

(Continued)

Boring Designation CB-DC-16

DRILLING LOG (Cont. Sheet)	INSTALLATION: Jacksonville District			SHEET 2 OF 2 SHEETS
PROJECT: Arecibo River, PR	COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.)	HORIZONTAL: NAD27	VERTICAL: NGVD29	
LOCATION COORDINATES: X = 404,211 Y = 225,082	ELEVATION TOP OF BORING: 9.8 Ft.			

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
				100	11		SPT Sampler -6.7	1 / 1 / 1	2
				100	12		SPT Sampler -8.2	1 / 1 / 1	2
-8.7	18.5								
			CLAY, fat, high plasticity, soft, trace plant debris, no reaction with HCl, wet, homogeneous, dark gray (CH)	67	13		SPT Sampler -9.7	1 / 1 / 0	1
			From El. -10.0 to -11.2 Ft., few subangular fine-grained sand-sized alluvial deposit	67	14		SPT Sampler -11.2	2 / 2 / 2	4
-11.2	21.0								

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
5	6.0/7.5	
8	10.5/12.0	

3. Additional Laboratory Testing

2	Moisture Content
5	Moisture Content
8	Moisture Content
11	Moisture Content
13	Moisture Content

140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).

Abbreviations:
WOH = Weight of Hammer.

15 20 25 30 35

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT: Arecibo River, PR Diversion Channel	9. SIZE AND TYPE OF BIT: See Remarks
	10. COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.); HORIZONTAL: NAD27; VERTICAL: NGVD29
2. BORING DESIGNATION: CB-DC-17; LOCATION COORDINATES: X = 404,940 Y = 226,569	11. MANUFACTURER'S DESIGNATION OF DRILL: CME-45C; ☐ AUTO HAMMER ☒ MANUAL HAMMER
3. DRILLING AGENCY: Geoconsult Inc.; CONTRACTOR FILE NO.: 3006-03	12. TOTAL SAMPLES: DISTURBED 14; UNDISTURBED (UD) 0
4. NAME OF DRILLER: STEVEN PEREZ	13. TOTAL NUMBER CORE BOXES: 2
	14. ELEVATION GROUND WATER: 3.2 Ft. measured after 24 hrs.
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED; DEG. FROM VERTICAL: ; BEARING:	15. DATE BORING: STARTED 08-12-03; COMPLETED 08-12-03
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: 10.5 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: 67 %
8. TOTAL DEPTH OF BORING: 21.0 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Bernard J. Seifert, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
10.5	0.0						10.5		
			CLAY, lean, medium plasticity, hard, few plant debris, no reaction with HCl, dry, dark yellowish brown (CL)	45	1		SPT Sampler; 9.0	3, 3, 3	6
			From El. 8.1 to 7.0 Ft., discontinue plant debris, yellowish brown	33	2		SPT Sampler; 7.5	3, 3, 4	7
			From El. 7.0 to 6.2 Ft., few fine-grained sand-sized alluvial deposit, trace plant debris	33	3		SPT Sampler; 6.0	4, 5, 3	8
6.2	4.3		SAND, poorly-graded, mostly subangular medium-grained sand-sized alluvial deposit, no reaction with HCl, dry, weak cementation, homogeneous, yellowish brown (SP)	100	4		SPT Sampler; 4.5	3, 2, 2	4
			From El. 4.6 to 4.1 Ft., mostly subangular medium-grained sand-sized alluvial deposit						
4.1	6.4		SAND, well-graded, mostly subangular to subrounded fine to coarse-grained sand-sized alluvial deposit, trace subrounded fine gravel-sized alluvial deposit, no reaction with HCl, wet, weak cementation, homogeneous, yellowish brown (SW)	100	5		SPT Sampler; 3.0	4, 4, 3	7
				100	6		SPT Sampler; 1.5	3, 4, 4	8
				67	7		SPT Sampler; 0.0	4, 5, 6	11
			From El. 0.2 to -4.9 Ft., few rounded fine gravel-sized alluvial deposit, trace subangular coarse gravel-sized sandstone, trace silt, olive gray	67	8		SPT Sampler; -1.5	4, 3, 4	7
				67	9		SPT Sampler; -3.0	4, 5, 8	13
				67	10		SPT Sampler; -4.5	7, 4, 5	9

Depth scale: 0, 5, 10, 15

(Continued)

Boring Designation CB-DC-17

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District		SHEET 2 OF 2 SHEETS
PROJECT Arecibo River, PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29
LOCATION COORDINATES X = 404,940 Y = 226,569	ELEVATION TOP OF BORING 10.5 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
			From El. -4.9 to -6.5 Ft., few subrounded fine gravel-sized alluvial deposit	67	11		SPT Sampler -6.0	5 7 8	15
			From El. -6.5 to -7.8 Ft., little subrounded fine to coarse gravel-sized alluvial deposit	67	12		SPT Sampler -7.5	6 6 7	13
-9.2	19.7		From El. -7.8 to -9.2 Ft., little silt	45	13		SPT Sampler -9.0	5 5 7	12
-10.5	21.0		CLAY, fat, high plasticity, firm, trace plant debris, no reaction with HCl, moist, gray (CH)	83	14		SPT Sampler -10.5	2 3 3	6

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
4	4.5/6.0	
8	10.5/12.0	
11	15.0/16.5	

3. Additional Laboratory Testing

4	Moisture Content
8	Moisture Content
11	Moisture Content
14	Moisture Content

140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).

15 20 25 30 35

Boring Designation CB-RGA-14A

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 3 SHEETS

1. PROJECT: Arecibo River, PR Arecibo Levee	9. SIZE AND TYPE OF BIT: See Remarks
	10. COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.) — HORIZONTAL: NAD27 — VERTICAL: NGVD29
2. BORING DESIGNATION: CB-RGA-14A — LOCATION COORDINATES: X = 402,705 Y = 232,425	11. MANUFACTURER'S DESIGNATION OF DRILL: CME-45B — ☐ AUTO HAMMER ☒ MANUAL HAMMER
3. DRILLING AGENCY: Geoconsult Inc. — CONTRACTOR FILE NO.: 3006-03	12. TOTAL SAMPLES — DISTURBED: 30 — UNDISTURBED (UD): 0
4. NAME OF DRILLER: CARLOS ROSA	13. TOTAL NUMBER CORE BOXES: 1
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED — DEG. FROM VERTICAL: — BEARING:	14. ELEVATION GROUND WATER: 0.8 Ft. measured after 24 hrs.
	15. DATE BORING — STARTED: 08-11-03 — COMPLETED: 08-12-03
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: 4.8 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: 68 %
8. TOTAL DEPTH OF BORING: 45.0 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Bernard J. Seifert, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
4.8	0.0						4.8		
3.1	1.7		FILL, high plasticity, hard, little subangular fine to medium-grained sand-sized alluvial deposit, trace angular fine to coarse gravel-sized alluvial deposit, weak reaction with HCl, moist, dark yellowish brown	55	1		SPT Sampler 3.3	6, 7, 5	12
-0.7	5.5		SILT, inorganic-L, nonplastic, soft, some subangular medium-grained sand-sized alluvial deposit, trace plant debris, no reaction with HCl, wet, homogeneous, slightly organic odor, dark gray (ML)	67	2		SPT Sampler 1.8	4, 3, 1	4
				33	3		SPT Sampler 0.3	4, 5, 3	8
				100	4		SPT Sampler -1.2	6, 3, 4	7
-1.5	6.3		SAND, silty, some fine-grained sand-sized alluvial deposit, weak reaction with HCl, wet, homogeneous, slightly organic odor, dark gray (SM)						
-3.5	8.3		CLAY, fat, high plasticity, very soft, little subangular fine to medium-grained sand-sized alluvial deposit, weak reaction with HCl, wet, homogeneous, dark grayish brown (CH)	55	5		SPT Sampler -2.7	1, 2, WOH	2
				55	6		SPT Sampler -4.2	WOH, 5, 50	55
-6.1	10.9		SAND, well-graded, mostly subangular fine to coarse-grained sand-sized alluvial deposit, few subrounded fine gravel-sized alluvial deposit, trace shell, strong reaction with HCl, wet, weak cementation, homogeneous, gray (SW)	89	7		SPT Sampler -5.7	30, 20, 25	45
			SAND, poorly-graded, mostly subangular fine to medium-grained sand-sized alluvial deposit, few subangular fine gravel-sized alluvial deposit, strong reaction with HCl, wet, weak cementation, stratified, light gray (SP)	100	8		SPT Sampler -7.2	6, 17, 27	44
				89	9		SPT Sampler -8.7	20, 8, 7	15
				55	10		SPT Sampler -10.2	7, 8, 9	17

Depth scale: 0, 5, 10, 15

(Continued)

Boring Designation CB-RGA-14A

DRILLING LOG (Cont. Sheet)	INSTALLATION: Jacksonville District		SHEET 2 OF 3 SHEETS
PROJECT: Arecibo River, PR	COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.)	HORIZONTAL: NAD27	VERTICAL: NGVD29
LOCATION COORDINATES: X = 402,705 Y = 232,425	ELEVATION TOP OF BORING: 4.8 Ft.		

ELEV.	DEPTH	CLASSIFICATION OF MATERIALS
-10.8	15.6	SAND, well-graded, mostly subangular to subrounded fine to coarse-grained sand-sized alluvial deposit, little subrounded fine gravel-sized alluvial deposit, weak reaction with HCl, moist, weak cementation, homogeneous, light olive brown (SW) From El. -12.0 to -15.6 Ft., few subrounded fine gravel-sized alluvial deposit From El. -15.6 to -16.7 Ft., little subrounded fine gravel-sized alluvial deposit
-16.7	21.5	CLAY, fat, high plasticity, firm, weak reaction with HCl, moist, homogeneous, light olive brown (CH)
-18.0	22.8	SAND, poorly-graded, mostly subangular fine to medium-grained sand-sized alluvial deposit, weak reaction with HCl, moist, weak cementation, homogeneous, light olive brown (SP)
-19.7	24.5	SAND, clayey, mostly subangular fine to medium-grained sand-sized alluvial deposit, no reaction with HCl, moist, weak cementation, homogeneous, reddish brown (SC)
-22.5	27.3	CLAY, fat, high plasticity, firm, trace fine-grained sand-sized alluvial deposit, no reaction with HCl, moist, homogeneous, brownish yellow (CH) From El. -23.6 to -26.0 Ft., some subangular medium-grained sand-sized alluvial deposit, olive brown From El. -26.0 to -27.2 Ft., little fine-grained sand-sized alluvial deposit, trace rounded fine gravel-sized alluvial deposit, weak red From El. -27.2 to -29.5 Ft., little subangular fine to coarse-grained sand-sized alluvial deposit, light olive brown From El. -29.5 to -30.4 Ft., little fine-grained sand-sized alluvial deposit, trace subrounded

% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
67	11		SPT Sampler -11.7	9, 11, 11	22
78	12		SPT Sampler -13.2	13, 13, 13	26
78	13		SPT Sampler -14.7	10, 12, 13	25
89	14		SPT Sampler -16.2	9, 10, 11	21
55	15		SPT Sampler -17.7	8, 7, 6	13
55	16		SPT Sampler -19.2	6, 7, 8	15
67	17		SPT Sampler -20.7	4, 5, 6	11
78	18		SPT Sampler -22.2	4, 6, 7	13
55	19		SPT Sampler -23.7	7, 11, 15	26
89	20		SPT Sampler -25.2	7, 8, 9	17
89	21		SPT Sampler -26.7	4, 5, 9	14
55	22		SPT Sampler -28.2	11, 16, 15	31
67	23		SPT Sampler -29.7	11, 11, 16	27
55	24		SPT Sampler	9	

Depth scale: 15, 20, 25, 30, 35

Boring Designation CB-RGA-14A

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District	SHEET 3 OF 3 SHEETS
PROJECT Arecibo River, PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.); HORIZONTAL NAD27; VERTICAL NGVD29	
LOCATION COORDINATES X = 402,705 Y = 232,425	ELEVATION TOP OF BORING 4.8 Ft.	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
			fine gravel-sized alluvial deposit	55	24		SPT Sampler -31.2	11 / 15	26
			From El. -32.0 to -33.5 Ft., few subrounded to rounded fine gravel-sized alluvial deposit	67	25		SPT Sampler -32.7	12 / 17 / 22	39
			From El. -33.5 to -35.9 Ft., discontinue subrounded to rounded fine gravel-sized alluvial deposit	78	26		SPT Sampler -34.2	8 / 10 / 11	21
-35.9	40.7			45	27		SPT Sampler -35.7	9 / 10 / 8	18
			SAND, clayey, mostly subangular fine to medium-grained sand-sized alluvial deposit, no reaction with HCl, moist, weak cementation, homogeneous, light yellowish brown (SC)	55	28		SPT Sampler -37.2	6 / 11 / 16	27
				78	29		SPT Sampler -38.7	11 / 15 / 17	32
-40.2	45.0			55	30		SPT Sampler -40.2	7 / 8 / 10	18

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
4	4.5/6.0	
8	10.5/12.0	
14	19.5/21.0	
29	42.0/43.5	

3. Additional Laboratory Testing

4 Moisture Content
8 Moisture Content
14 Moisture Content
20 Moisture Content
25 Moisture Content
29 Moisture Content

140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).

Abbreviations:
WOH = Weight of Hammer.

35 40 45 50 55

APPENDIX B
TEST PIT LOGS

Boring Designation TP-BA2-1

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT Arecibo River, PR Alternate Borrow Area (South of PR-22)	9. SIZE AND TYPE OF BIT: See Remarks 10. COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.) — HORIZONTAL: NAD27 — VERTICAL: NGVD29
2. BORING DESIGNATION: TP-BA2-1 — LOCATION COORDINATES: X = 397,013 Y = 225,283	11. MANUFACTURER'S DESIGNATION OF DRILL: Backhoe — ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Geoconsult Inc. — CONTRACTOR FILE NO.: 3006-03	12. TOTAL SAMPLES — DISTURBED: 0 — UNDISTURBED (UD): 0
4. NAME OF DRILLER	13. TOTAL NUMBER CORE BOXES: 0
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED — DEG. FROM VERTICAL — BEARING	14. ELEVATION GROUND WATER: Not Encountered 15. DATE BORING — STARTED: 08-13-03 — COMPLETED: 08-13-03
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: 165.6 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: Not Recorded
8. TOTAL DEPTH OF BORING: 10.3 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Jorge I. Wichy, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
165.6	0.0								
			SILT, inorganic-L (SAPROLITIC LIMESTONE), nonplastic, firm, little subangular medium-grained sand-sized quartz, little angular medium-grained sand-sized limestone, little angular coarse gravel-sized limestone, strong reaction with HCl, dry, chalky texture at first 2 inches, few subangular limestone cobble (6 to 11 inches), white to very pale orange (ML) From El. 163.8 to 155.3 Ft., little subangular fine to medium-grained sand-sized quartz, little subangular fine to coarse gravel-sized limestone, few subangular limestone cobble (3 to 10 inches), few subangular limestone boulders (14 to 22 inches), very pale orange to pale orange						
155.3	10.3						155.3		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Bulk sample collected at 8.67 ft

3. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
	/10.3	

0 5 10 15

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(Continued)

Boring Designation TP-BA2-1

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District			SHEET 2 OF 2 SHEETS
PROJECT Arecibo River, PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29	
LOCATION COORDINATES X = 397,013 Y = 225,283	ELEVATION TOP OF BORING 165.6 Ft.			

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
			4. Additional Laboratory Testing Moisture Content Compaction						

15

20

25

30

35

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JUN 02

Boring Designation TP-BA2-2

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT: Arecibo River, PR Alternate Borrow Area (South of PR-22)	9. SIZE AND TYPE OF BIT: See Remarks
	10. COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.) — HORIZONTAL: NAD27 — VERTICAL: NGVD29
2. BORING DESIGNATION: TP-BA2-2 — LOCATION COORDINATES: X = 398,163 Y = 225,497	11. MANUFACTURER'S DESIGNATION OF DRILL: Backhoe — ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Geoconsult Inc. — CONTRACTOR FILE NO.: 3006-03	12. TOTAL SAMPLES — DISTURBED: 0 — UNDISTURBED (UD): 0
4. NAME OF DRILLER:	13. TOTAL NUMBER CORE BOXES: 0
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED — DEG. FROM VERTICAL: — BEARING:	14. ELEVATION GROUND WATER: Not Encountered
	15. DATE BORING — STARTED: 08-14-03 — COMPLETED: 08-14-03
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: 159.6 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: Not Recorded
8. TOTAL DEPTH OF BORING: 10.2 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Bernard J. Seifert, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
159.6	0.0								
158.8	0.8		CLAY, lean, medium plasticity, firm, little subangular fine to medium-grained sand-sized limestone, few angular to subangular fine gravel-sized limestone, few plant debris, weak reaction with HCl, dry, dark yellowish brown (CL)						
157.4	2.2		CLAY, lean (SAPROLITIC LIMESTONE), medium plasticity, hard, little angular to subangular fine to coarse-grained sand-sized limestone, little subangular fine gravel-sized limestone, strong reaction with HCl, dry, light olive brown (CL)						
156.3	3.3		GRAVEL, well-graded (SAPROLITIC LIMESTONE), mostly subangular fine to coarse gravel-sized limestone, little subangular fine to medium-grained sand-sized limestone, few silt, strong reaction with HCl, dry, weak cementation, white (GW)						
			SAND, well-graded (SAPROLITIC LIMESTONE), mostly angular fine to coarse-grained sand-sized limestone, some angular to subangular coarse gravel-sized limestone, strong reaction with HCl, dry, weak cementation, few angular to subangular limestone cobble, white to pale yellow (SW)						
			From El. 151.1 to 150.4 Ft., trace angular limestone cobble						
149.9	9.7		From El. 150.4 to 149.9 Ft., trace subangular limestone boulder						
149.4	10.2		COBBLES/BOULDERS (SAPROLITIC LIMESTONE), strong reaction with HCl, dry, moderate cementation, mostly subangular limestone cobble, white pale yellow				149.4		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Bulk sample collected at 6.00 ft

3. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION

0 5 10 15

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JUN 02

(Continued)

Boring Designation TP-BA2-2

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District			SHEET 2 OF 2 SHEETS
PROJECT Arecibo River, PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29	
LOCATION COORDINATES X = 398,163 Y = 225,497	ELEVATION TOP OF BORING 159.6 Ft.			

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
			-- /10.2 4. Additional Laboratory Testing Moisture Content Compaction						

15

20

25

30

35

SAJ FORM 1836-A
JUN 02

Boring Designation TP-BA2-3

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT: Arecibo River, PR Alternate Borrow Area (South of PR-22)	9. SIZE AND TYPE OF BIT: See Remarks
	10. COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.) — HORIZONTAL: NAD27 — VERTICAL: NGVD29
2. BORING DESIGNATION: TP-BA2-3 — LOCATION COORDINATES: X = 397,186 Y = 224,347	11. MANUFACTURER'S DESIGNATION OF DRILL: Backhoe — ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Geoconsult Inc. — CONTRACTOR FILE NO.: 3006-03	12. TOTAL SAMPLES — DISTURBED: 0 — UNDISTURBED (UD): 0
4. NAME OF DRILLER:	13. TOTAL NUMBER CORE BOXES: 0
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED — DEG. FROM VERTICAL: — BEARING:	14. ELEVATION GROUND WATER: Not Encountered
	15. DATE BORING — STARTED: 08-14-03 — COMPLETED: 08-14-03
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: 199.6 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: Not Recorded
8. TOTAL DEPTH OF BORING: 10.0 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Bernard J. Seifert, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
199.6	0.0								
198.6	1.0		GRAVEL, well-graded (SAPROLITIC LIMESTONE), mostly angular to subangular fine to coarse gravel-sized limestone, little angular to subangular medium to coarse-grained sand-sized limestone, few silt, strong reaction with HCl, dry, weak cementation, few subangular limestone cobble, yellow to pinkish yellow (GW)						
191.1	8.5		SAND, well-graded (SAPROLITIC LIMESTONE), mostly angular to subangular medium to coarse-grained sand-sized limestone, few angular to subangular coarse gravel-sized limestone, few silt, strong reaction with HCl, dry, weak cementation, little subangular limestone cobble, yellow (SW)						
189.6	10.0		COBBLES/BOULDERS (SAPROLITIC LIMESTONE), little angular to subangular medium to coarse-grained sand-sized limestone, few silt, strong reaction with HCl, dry, moderate cementation, mostly subangular limestone cobble, yellow				189.6		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Bulk sample collected at 3.00 ft

3. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
	/10.0	

0 5 10 15

SAJ FORM 1836
JUN 02

(Continued)

Boring Designation TP-BA2-3

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District			SHEET 2 OF 2 SHEETS
PROJECT Arecibo River, PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29	
LOCATION COORDINATES X = 397,186 Y = 224,347	ELEVATION TOP OF BORING 199.6 Ft.			

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
			4. Additional Laboratory Testing Moisture Content Compaction						

15
20
25
30
35

SAJ FORM 1836-A
JUN 02

Boring Designation TP-BA2-4

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT Arecibo River, PR Alternate Borrow Area (South of PR-22)	9. SIZE AND TYPE OF BIT See Remarks
	10. COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.); HORIZONTAL NAD27; VERTICAL NGVD29
2. BORING DESIGNATION TP-BA2-4; LOCATION COORDINATES X = 397,033 Y = 224,970	11. MANUFACTURER'S DESIGNATION OF DRILL Backhoe; ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY Geoconsult Inc.; CONTRACTOR FILE NO. 3006-03	12. TOTAL SAMPLES DISTURBED 0; UNDISTURBED (UD) 0
4. NAME OF DRILLER	13. TOTAL NUMBER CORE BOXES 0
5. DIRECTION OF BORING ☒ VERTICAL ☐ INCLINED; DEG. FROM VERTICAL; BEARING	14. ELEVATION GROUND WATER Not Encountered
	15. DATE BORING STARTED 08-13-03; COMPLETED 08-13-02
6. THICKNESS OF OVERBURDEN 0.0 Ft.	16. ELEVATION TOP OF BORING 163.2 Ft.
7. DEPTH DRILLED INTO ROCK 0.0 Ft.	17. TOTAL RECOVERY FOR BORING Not Recorded
8. TOTAL DEPTH OF BORING 10.5 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR Jorge I. Wichy, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
163.2	0.0								
			SILT, inorganic-L (SAPROLITIC LIMESTONE), nonplastic, firm, little subangular fine to medium-grained sand-sized quartz, little subangular fine to medium-grained sand-sized limestone, few subangular coarse gravel-sized limestone, strong reaction with HCl, dry, very pale brown (ML)						
			From El. 157.8 to 152.7 Ft., some subangular fine to coarse-grained sand-sized limestone, few subangular limestone cobble and boulders, light yellowish brown						
152.7	10.5						152.7		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Bulk sample collected at 10.17 ft

3. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
	/10.5	

0 5 10 15

SAJ FORM 1836
JUN 02

(Continued)

Boring Designation TP-BA2-4

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District			SHEET 2 OF 2 SHEETS
PROJECT Arecibo River, PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29	
LOCATION COORDINATES X = 397,033 Y = 224,970	ELEVATION TOP OF BORING 163.2 Ft.			

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
			4. Additional Laboratory Testing Moisture Content Compaction						

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JUN 02

Boring Designation TP-BA2-5

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 1 SHEETS

1. PROJECT: Arecibo River, PR; Alternate Borrow Area (South of PR-22)	9. SIZE AND TYPE OF BIT: See Remarks
	10. COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.) — HORIZONTAL: NAD27 — VERTICAL: NGVD29
2. BORING DESIGNATION: TP-BA2-5 — LOCATION COORDINATES: X = 397,472 Y = 224,863	11. MANUFACTURER'S DESIGNATION OF DRILL: Backhoe — ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Geoconsult Inc. — CONTRACTOR FILE NO.: 3006-03	12. TOTAL SAMPLES — DISTURBED: 0 — UNDISTURBED (UD): 0
4. NAME OF DRILLER:	13. TOTAL NUMBER CORE BOXES: 0
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED — DEG. FROM VERTICAL: — BEARING:	14. ELEVATION GROUND WATER: Not Encountered
	15. DATE BORING — STARTED: 08-26-03 — COMPLETED: 08-26-03
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: 68.0 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: Not Recorded
8. TOTAL DEPTH OF BORING: 5.2 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Bernard J. Seifert, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
68.0	0.0								
65.0	3.0		CLAY, fat (SAPROLITIC LIMESTONE), high plasticity, hard, little subangular fine to medium-grained sand-sized limestone, little subangular coarse gravel-sized limestone, few limestone, weak reaction with HCl, dry, few subangular cobble size limestone, reddish brown (CH) From El. 67.2 to 65.0 Ft., little angular coarse gravel-sized limestone, trace angular boulder size limestone						
64.4	3.6		SAND, well-graded (SAPROLITIC LIMESTONE), mostly angular to subangular fine to medium-grained sand-sized limestone, few angular to subangular fine to coarse gravel-sized limestone, strong reaction with HCl, dry, reddish brown (SW)						
63.5	4.5		CLAY, fat (SAPROLITIC LIMESTONE), high plasticity, hard, few angular to subangular fine to coarse gravel-sized limestone, little angular cobble size limestone, trace boulder size limestone, reddish brown (CH)						
62.8	5.2		COBBLES/BOULDERS (SAPROLITIC LIMESTONE), trace angular medium-grained sand-sized limestone, trace clay, strong reaction with HCl, dry, pinkish white				62.8		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Bulk sample collected at 4.50 ft

3. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
	/5.2	

4. Additional Laboratory Testing

Moisture Content
Compaction

0 5 10 15

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DRILLING LOG

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 1 SHEETS

1. PROJECT: Arecibo River, PR Alternate Borrow Area (South of PR-22)	9. SIZE AND TYPE OF BIT: See Remarks
	10. COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.) — HORIZONTAL: NAD27 — VERTICAL: NGVD29
2. BORING DESIGNATION: TP-BA2-6 — LOCATION COORDINATES: X = 397,459 Y = 225,244	11. MANUFACTURER'S DESIGNATION OF DRILL: Backhoe — ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Geoconsult Inc. — CONTRACTOR FILE NO.: 3006-03	12. TOTAL SAMPLES — DISTURBED: 0 — UNDISTURBED (UD): 0
4. NAME OF DRILLER:	13. TOTAL NUMBER CORE BOXES: 0
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED — DEG. FROM VERTICAL: — BEARING:	14. ELEVATION GROUND WATER: Not Encountered
	15. DATE BORING — STARTED: 08-14-03 — COMPLETED: 08-14-03
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: 172.4 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: Not Recorded
8. TOTAL DEPTH OF BORING: 6.2 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Bernard J. Seifert, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
172.4	0.0		SILT, inorganic-H, low plasticity, hard, some subangular fine to medium-grained sand-sized sand, few subangular fine gravel-sized limestone, trace plant debris, strong reaction with HCl, dry, yellowish brown (MH)						
171.6	0.8		GRAVEL, well-graded (SAPROLITIC LIMESTONE), strong reaction with HCl, dry, weak cementation, mostly subangular limestone cobble, brownish yellow (GW)						
167.6	4.8		COBBLES/BOULDERS (SAPROLITIC LIMESTONE), few subangular fine to medium-grained sand-sized sand, trace silt, strong reaction with HCl, dry, moderate cementation, subangular limestone cobble and boulder up to 1.8 ft, brownish yellow						
166.2	6.2	S	LIMESTONE, sandy, fossiliferous, very hard, slightly weathered, fine-grained				166.2		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Bulk sample collected at 3.00 ft

3. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
	/6.2	

4. Additional Laboratory Testing

Moisture Content
Compaction

0 5 10 15

Boring Designation TP-BA2-7

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT: Arecibo River, PR Alternate Borrow Area (South of PR-22)	9. SIZE AND TYPE OF BIT: See Remarks
	10. COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.) — HORIZONTAL: NAD27 — VERTICAL: NGVD29
2. BORING DESIGNATION: TP-BA2-7 — LOCATION COORDINATES: X = 397,809 Y = 225,463	11. MANUFACTURER'S DESIGNATION OF DRILL: Backhoe — ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Geoconsult Inc. — CONTRACTOR FILE NO.: 3006-03	12. TOTAL SAMPLES — DISTURBED: 0 — UNDISTURBED (UD): 0
4. NAME OF DRILLER:	13. TOTAL NUMBER CORE BOXES: 0
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED — DEG. FROM VERTICAL: — BEARING:	14. ELEVATION GROUND WATER: Not Encountered
	15. DATE BORING — STARTED: 08-13-03 — COMPLETED: 08-13-03
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: 169.7 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: Not Recorded
8. TOTAL DEPTH OF BORING: 11.3 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Jorge I. Wichy, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
169.7	0.0								
			SILT, inorganic-L, nonplastic, firm, little subangular fine to medium-grained sand-sized quartz, few subangular medium to coarse-grained sand-sized limestone, strong reaction with HCl, dry, very pale brown to light yellowish brown (ML)						
158.5	11.3						158.5		
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. Bulk sample collected at 11.00 ft 3. Laboratory Testing Results SAMPLE SAMPLE LABORATORY						

SAJ FORM 1836
JUN 02

(Continued)

Boring Designation TP-BA2-7

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District		SHEET 2 OF 2 SHEETS
PROJECT Arecibo River, PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29
LOCATION COORDINATES X = 397,809 Y = 225,463	ELEVATION TOP OF BORING 169.7 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
			ID DEPTH CLASSIFICATION -- /11.3 4. Additional Laboratory Testing Moisture Content Compaction						

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SAJ FORM 1836-A
JUN 02

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT: Arecibo River, PR Diversion Channel	9. SIZE AND TYPE OF BIT: See Remarks
	10. COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.) — HORIZONTAL: NAD27 — VERTICAL: NGVD29
2. BORING DESIGNATION: TP-DC-1 — LOCATION COORDINATES: X = 402,278 Y = 223,847	11. MANUFACTURER'S DESIGNATION OF DRILL: Backhoe — ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Geoconsult Inc. — CONTRACTOR FILE NO.: 3006-03	12. TOTAL SAMPLES — DISTURBED: 0 — UNDISTURBED (UD): 0
4. NAME OF DRILLER:	13. TOTAL NUMBER CORE BOXES: 0
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED — DEG. FROM VERTICAL: — BEARING:	14. ELEVATION GROUND WATER: 10.4 Ft.
	15. DATE BORING — STARTED: 08-07-03 — COMPLETED: 08-07-03
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: 20.2 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: Not Recorded
8. TOTAL DEPTH OF BORING: 11.0 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Jorge I. Wichy, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
20.2	0.0								
			CLAY, lean, medium plasticity, firm, few fine-grained sand-sized alluvial deposit, few plant debris, no reaction with HCl, dry, dark yellowish brown (CL) From El. 18.8 to 16.6 Ft., dark grayish brown						
16.6	3.6								
			CLAY, fat, high plasticity, firm, trace plant debris, no reaction with HCl, moist, reddish brown mottled, grayish brown (CH) From El. 10.9 to 9.2 Ft., soft, little subangular fine to medium-grained sand-sized alluvial deposit, no reaction with HCl, wet, reddish brown						
9.2	11.0						9.2		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Bulk sample collected at 7.00 ft

3. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION

Boring Designation TP-DC-1

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District			SHEET 2 OF 2 SHEETS
PROJECT Arecibo River, PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29	
LOCATION COORDINATES X = 402,278 Y = 223,847	ELEVATION TOP OF BORING 20.2 Ft.			

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
			--- /11.0 4. Additional Laboratory Testing Moisture Content Compaction						

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DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT: Arecibo River, PR Diversion Channel	9. SIZE AND TYPE OF BIT: See Remarks
	10. COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.) — HORIZONTAL: NAD27 — VERTICAL: NGVD29
2. BORING DESIGNATION: TP-DC-2 — LOCATION COORDINATES: X = 403,466 Y = 223,620	11. MANUFACTURER'S DESIGNATION OF DRILL: Backhoe — ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Geoconsult Inc. — CONTRACTOR FILE NO.: 3006-03	12. TOTAL SAMPLES — DISTURBED: 0 — UNDISTURBED (UD): 0
4. NAME OF DRILLER:	13. TOTAL NUMBER CORE BOXES: 0
	14. ELEVATION GROUND WATER: 7.1 Ft.
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED — DEG. FROM VERTICAL: — BEARING:	15. DATE BORING — STARTED: 08-07-03 — COMPLETED: 08-07-03
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: 15.4 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: Not Recorded
8. TOTAL DEPTH OF BORING: 10.3 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Jorge I. Wichy, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
15.4	0.0								
14.3	1.2		CLAY, lean, medium plasticity, hard, few plant debris, no reaction with HCl, dry, dark yellowish brown (CL)						
8.6	6.8		CLAY, fat, high plasticity, firm, few fine-grained sand-sized alluvial deposit, no reaction with HCl, dry, yellowish brown (CH)						
5.2	10.3		SAND, poorly-graded with clay, mostly fine-grained sand-sized alluvial deposit, no reaction with HCl, moist, weak cementation, reddish brown (SP-SC) From El. 7.1 to 5.2 Ft., wet				5.2		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Bulk sample collected at 6.50 ft

3. Test Pit collapse at 8.75 ft

4. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION

SAJ FORM 1836
JUN 02

(Continued)

Boring Designation TP-DC-2

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District			SHEET 2 OF 2 SHEETS
PROJECT Arecibo River, PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29	
LOCATION COORDINATES X = 403,466 Y = 223,620	ELEVATION TOP OF BORING 15.4 Ft.			

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
	15		/10.3 5. Additional Laboratory Testing Moisture Content Compaction						
	20								
	25								
	30								
	35								

SAJ FORM 1836-A
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DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT: Arecibo River, PR Diversion Channel	9. SIZE AND TYPE OF BIT: See Remarks
	10. COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.) — HORIZONTAL: NAD27 — VERTICAL: NGVD29
2. BORING DESIGNATION: TP-DC-3 — LOCATION COORDINATES: X = 404,083 Y = 224,568	11. MANUFACTURER'S DESIGNATION OF DRILL: Backhoe — ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Geoconsult Inc. — CONTRACTOR FILE NO.: 3006-03	12. TOTAL SAMPLES — DISTURBED: 0 — UNDISTURBED (UD): 0
4. NAME OF DRILLER:	13. TOTAL NUMBER CORE BOXES: 0
	14. ELEVATION GROUND WATER: Not Encountered
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED — DEG. FROM VERTICAL: — BEARING:	15. DATE BORING — STARTED: 08-08-03 — COMPLETED: 08-08-03
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: 16.9 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: Not Recorded
8. TOTAL DEPTH OF BORING: 10.8 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Jorge I. Wichy, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/1 FT.	N-VALUE
16.9	0.0								
15.7	1.2		CLAY, lean, low plasticity, firm, few fine-grained sand-sized alluvial deposit, few plant debris, no reaction with HCl, dry, dark yellowish brown (CL)						
10.1	6.8		CLAY, fat, high plasticity, firm, few fine-grained sand-sized alluvial deposit, no reaction with HCl, dry, grayish brown (CH)						
6.1	10.8		SAND, poorly-graded with clay, mostly subangular to subrounded medium-grained sand-sized alluvial deposit, few subrounded to rounded fine to coarse gravel-sized alluvial deposit, no reaction with HCl, moist, weak cementation, yellowish brown (SP-SC)				6.1		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Bulk sample collected at 6.00 ft

3. Grab sample collected at 7.75 ft

4. Laboratory Testing Results

SAMPLE SAMPLE LABORATORY

0 5 10 15

Boring Designation TP-DC-3

DRILLING LOG (Cont. Sheet)

INSTALLATION	SHEET 2 OF 2 SHEETS
Jacksonville District	

PROJECT	COORDINATE SYSTEM/DATUM	HORIZONTAL	VERTICAL
Arecibo River, PR	State Plane, PR/VI (U.S. Ft.)	NAD27	NGVD29

LOCATION COORDINATES	ELEVATION TOP OF BORING
X = 404,083 Y = 224,568	16.9 Ft.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
			ID DEPTH CLASSIFICATION -- /10.8 5. Additional Laboratory Testing Moisture Content Compaction						

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SAJ FORM 1836-A
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DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT: Arecibo River, PR Diversion Channel	9. SIZE AND TYPE OF BIT: See Remarks
	10. COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.) — HORIZONTAL: NAD27 — VERTICAL: NGVD29
2. BORING DESIGNATION: TP-DC-4 — LOCATION COORDINATES: X = 404,498 Y = 225,623	11. MANUFACTURER'S DESIGNATION OF DRILL: Backhoe — ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Geoconsult Inc. — CONTRACTOR FILE NO.: 3006-03	12. TOTAL SAMPLES — DISTURBED: 0 — UNDISTURBED (UD): 0
4. NAME OF DRILLER:	13. TOTAL NUMBER CORE BOXES: 0
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED — DEG. FROM VERTICAL: — BEARING:	14. ELEVATION GROUND WATER: Not Encountered
	15. DATE BORING — STARTED: 08-12-03 — COMPLETED: 08-12-03
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: 12.6 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: Not Recorded
8. TOTAL DEPTH OF BORING: 10.2 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Bernard J. Seifert, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
12.6	0.0								
11.3	1.3		SILT, inorganic-H, low plasticity, firm, trace plant debris, no reaction with HCl, dry, dark yellowish brown (MH)						
9.6	3.0		CLAY, lean, medium plasticity, firm, trace angular coarse gravel-sized limestone, weak reaction with HCl, dry, yellowish brown (CL)						
3.1	9.5		CLAY, fat, high plasticity, firm, few subangular fine to medium-grained sand-sized alluvial deposit, no reaction with HCl, dry, gray and yellowish red mottled, yellowish brown (CH) From El. 6.1 to 4.1 Ft., grayish brown From El. 4.1 to 3.1 Ft., moist, gray						
2.4	10.2		SAND, clayey, mostly subangular medium-grained sand-sized alluvial deposit, trace plant debris, no reaction with HCl, moist, weak cementation, gray (SC)				2.4		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Bulk sample collected at 6.50 ft

3. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION

(Continued)

SAJ FORM 1836
JUN 02

Boring Designation TP-DC-4

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District		SHEET 2 OF 2 SHEETS
PROJECT Arecibo River, PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29
LOCATION COORDINATES X = 404,498 Y = 225,623	ELEVATION TOP OF BORING 12.6 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
			/10.2 4. Additional Laboratory Testing Moisture Content Compaction						

SAJ FORM 1836-A
JUN 02

DRILLING LOG

DRILLING LOG	**DIVISION** South Atlantic	**INSTALLATION** Jacksonville District	**SHEET** 1 **OF** 2 **SHEETS**

1. PROJECT Arecibo River, PR Diversion Channel	**9. SIZE AND TYPE OF BIT** See Remarks
	10. COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.) — **HORIZONTAL** NAD27 — **VERTICAL** NGVD29
2. BORING DESIGNATION TP-DC-5 — **LOCATION COORDINATES** X = 405,068 Y = 227,251	**11. MANUFACTURER'S DESIGNATION OF DRILL** Backhoe — ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY Geoconsult Inc. — **CONTRACTOR FILE NO.** 3006-03	**12. TOTAL SAMPLES** — **DISTURBED** 0 — **UNDISTURBED (UD)** 0
4. NAME OF DRILLER	**13. TOTAL NUMBER CORE BOXES** 0
5. DIRECTION OF BORING ☒ VERTICAL ☐ INCLINED — **DEG. FROM VERTICAL** — **BEARING**	**14. ELEVATION GROUND WATER** 1.7 Ft.
	15. DATE BORING — **STARTED** 08-11-03 — **COMPLETED** 08-11-03
6. THICKNESS OF OVERBURDEN 0.0 Ft.	**16. ELEVATION TOP OF BORING** 10.2 Ft.
7. DEPTH DRILLED INTO ROCK 0.0 Ft.	**17. TOTAL RECOVERY FOR BORING** Not Recorded
8. TOTAL DEPTH OF BORING 9.2 Ft.	**18. SIGNATURE AND TITLE OF INSPECTOR** Bernard J. Seifert, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
10.2	0.0								
9.0	1.2		CLAY, lean, medium plasticity, firm, little plant debris, no reaction with HCl, dry, dark yellowish brown (CL)						
4.2	6.0		SAND, silty, mostly subangular fine to medium-grained sand-sized alluvial deposit, trace plant debris, no reaction with HCl, dry, weak cementation, yellowish brown (SM) From El. 7.2 to 4.2 Ft., few subrounded coarse-grained sand-sized alluvial deposit						
2.7	7.5		SAND, poorly-graded, mostly subangular medium-grained sand-sized alluvial deposit, no reaction with HCl, dry, weak cementation, yellowish brown (SP)						
1.7	8.5		CLAY, fat, high plasticity, soft, trace plant debris, no reaction with HCl, moist, gray (CH)						
1.0	9.2		SAND, well-graded, mostly subangular medium to coarse-grained sand-sized alluvial deposit, few subangular to subrounded fine to coarse gravel-sized alluvial deposit, no reaction with HCl, wet, weak cementation, gray (SW)				1.0		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Bulk sample collected at 4.00 ft

3. Test Pit collapse at 9.00 ft

4. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION

(Continued)

Boring Designation TP-DC-5

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District			SHEET 2 OF 2 SHEETS
PROJECT Arecibo River, PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29	
LOCATION COORDINATES X = 405,068 Y = 227,251	ELEVATION TOP OF BORING 10.2 Ft.			

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
			/9.2 5. Additional Laboratory Testing Moisture Content Compaction						

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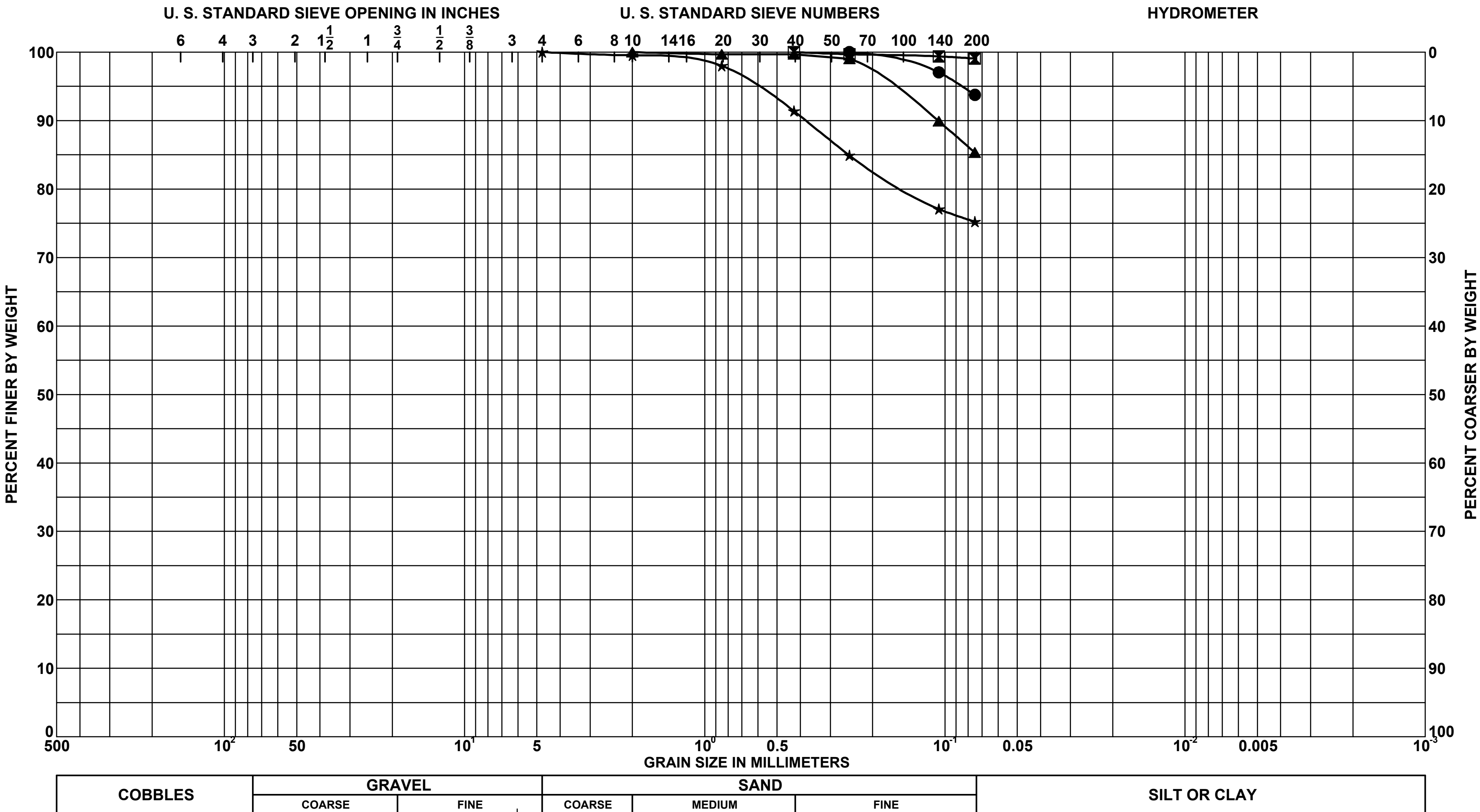
SAJ FORM 1836-A
JUN 02

APPENDIX C
LABORATORY TESTS



Sample No.		Depth	Classification	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	10	13.5 to 15.0 Ft.	MH					52	31	21
⧗	17	24.0 to 25.5 Ft.	ML					48	31	17
▲	22	31.5 to 33.0 Ft.	MH					50	29	21
★	27	39.0 to 40.5 Ft.	ML					42	26	16

PROJECT RIO GRANDE DE ARECIBO FLOOD CONTROL
Arecibo, Puerto Rico

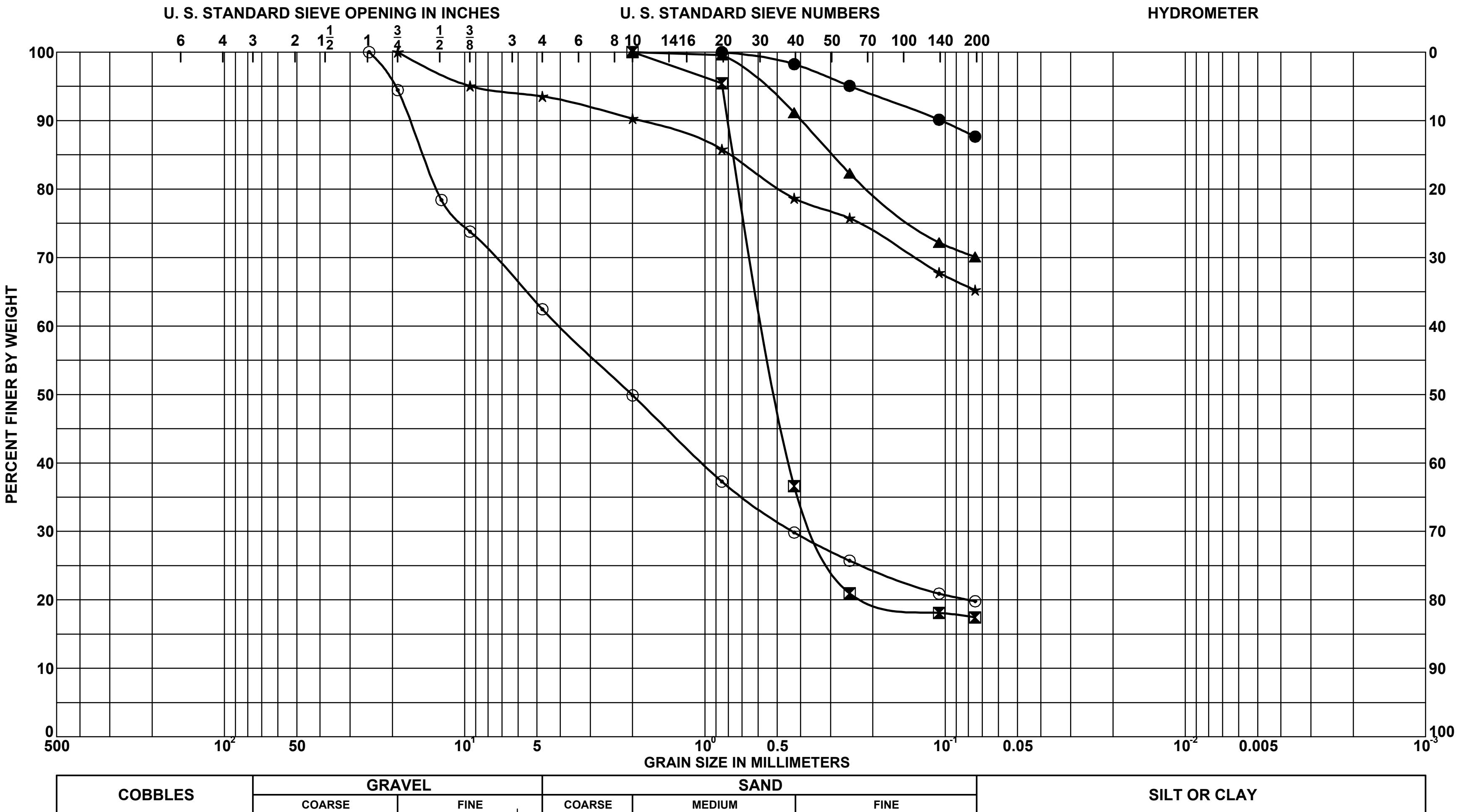
BORING NO. CB-DC-12

BORING ELEV. 18.7 Ft., NGVD29

DATE 8/26/2003

GRADATION CURVES

SAJ FORM 2087
JUN 02

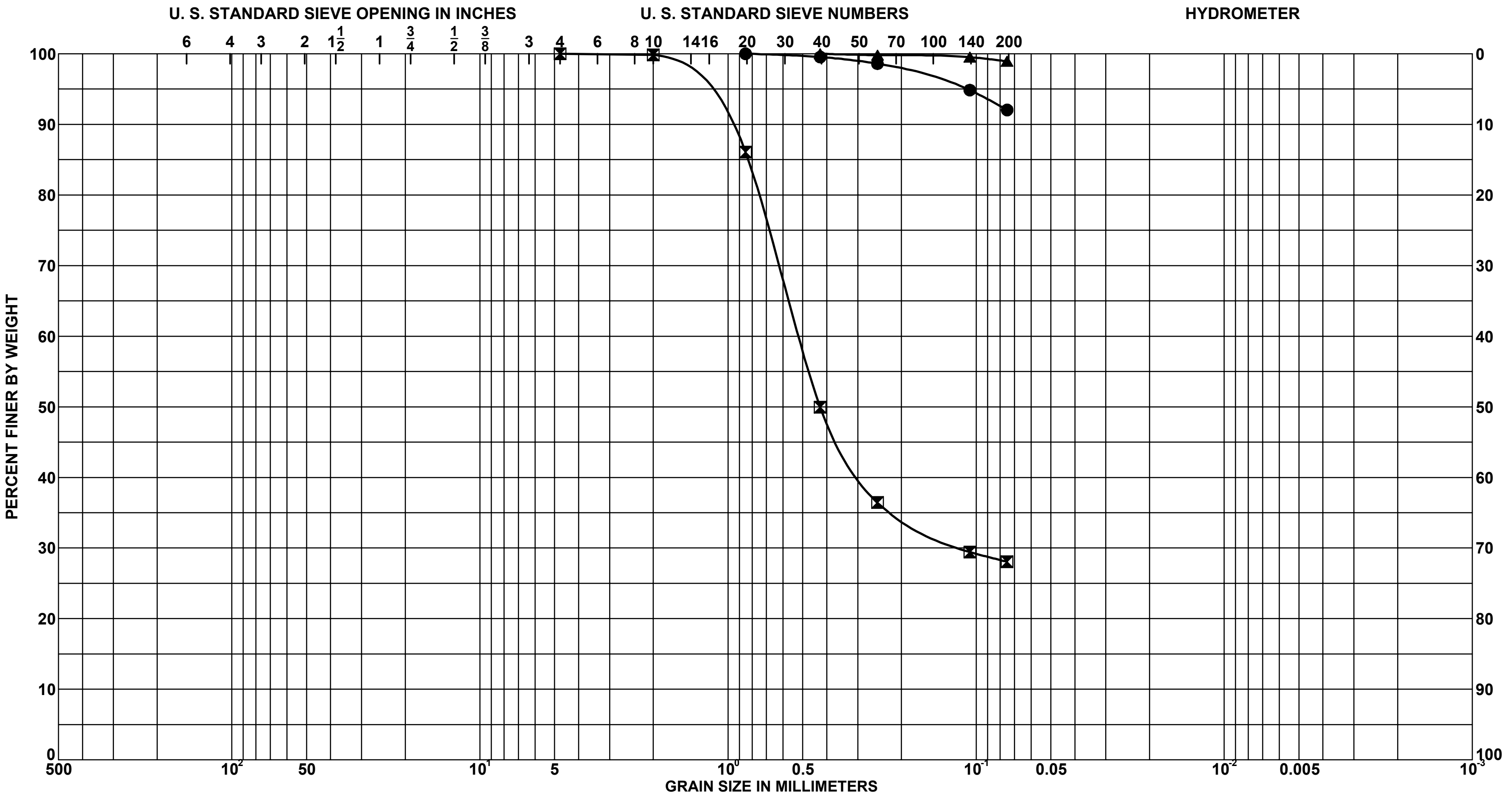


Sample No.		Depth	Classification	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	8	10.5 to 12.0 Ft.	ML					45	29	16
⧗	14	19.5 to 21.0 Ft.	SM					0	0	NP
▲	23	33.0 to 34.5 Ft.	ML					38	25	13
★	28	40.5 to 42.0 Ft.	CL					40	23	17
⊙	31	45.0 to 46.5 Ft.	SC					29	16	13

GRADATION CURVES

PROJECT	RIO GRANDE DE ARECIBO FLOOD CONTROL
	Arecibo, Puerto Rico
BORING NO.	CB-DC-13
BORING ELEV.	16.8 Ft., NGVD29
DATE	8/25/2003

SAJ FORM 2087
JUN 02



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.		Depth	Classification	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	3	3.0 to 4.5 Ft.	CH					54	27	27
⧗	7	9.0 to 10.5 Ft.	SM					30	23	7
▲	11	15.0 to 16.5 Ft.	MH					51	29	22

PROJECT RIO GRANDE DE ARECIBO FLOOD CONTROL

Arecibo, Puerto Rico

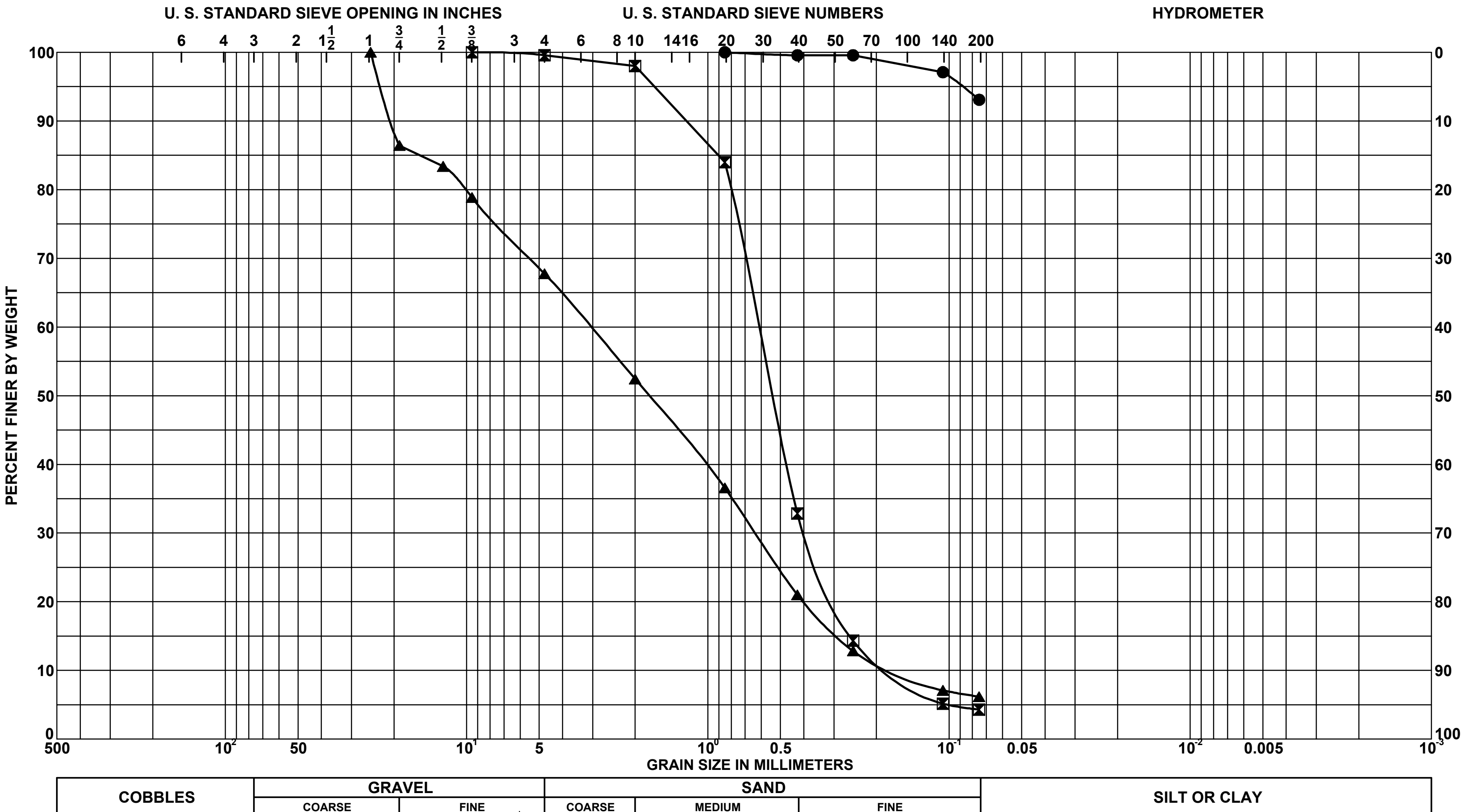
BORING NO. CB-DC-14

BORING ELEV. 21.9 Ft., NGVD29

DATE 8/26/2003

GRADATION CURVES

SAJ FORM 2087
JUN 02

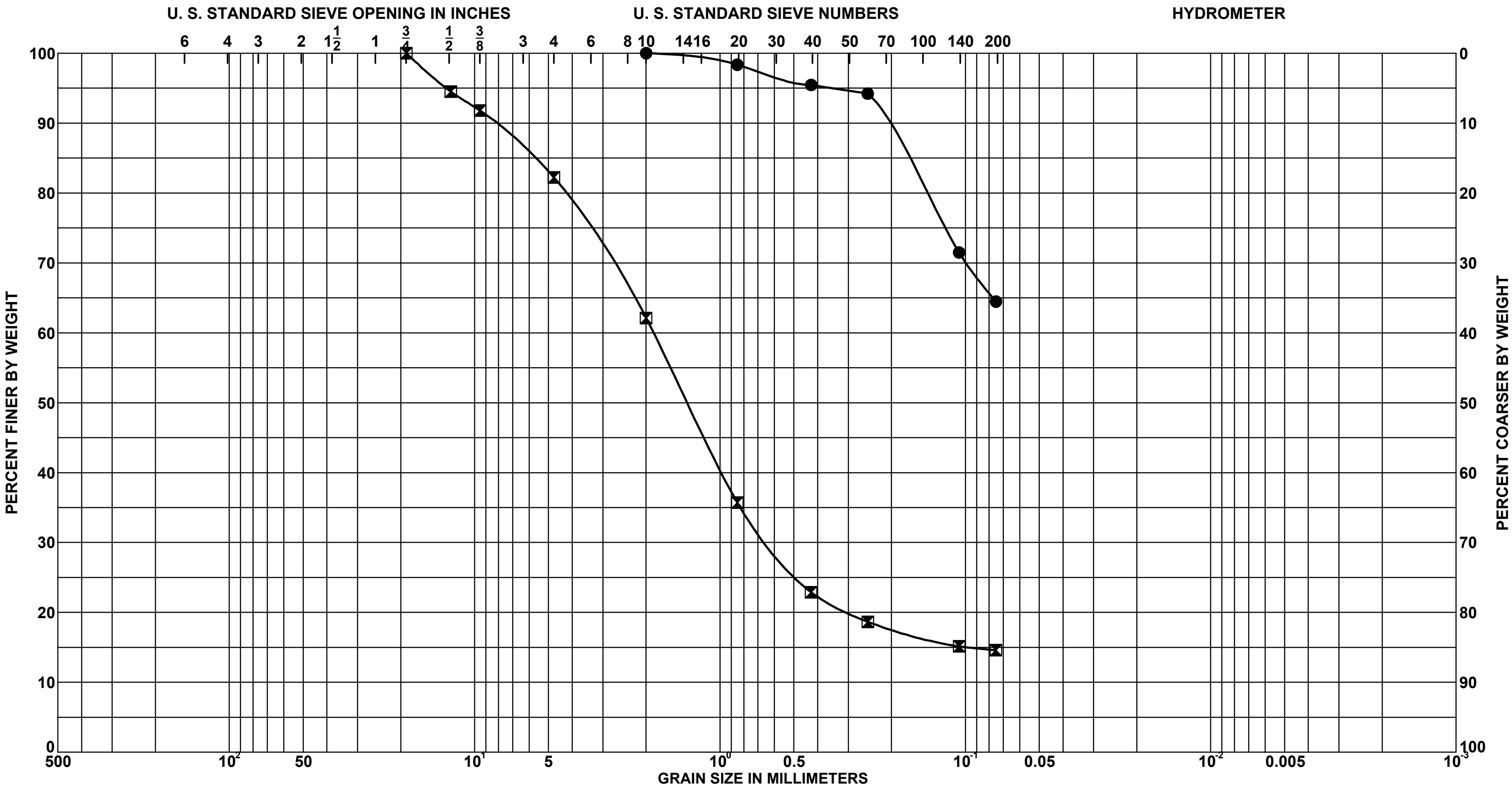


Sample No.		Depth	Classification	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	3	3.0 to 4.5 Ft.	ML					42	29	13
⧗	7	9.0 to 10.5 Ft.	SP					0	0	NP
▲	11	15.0 to 16.5 Ft.	SP-SM					0	0	NP

GRADATION CURVES

PROJECT	RIO GRANDE DE ARECIBO FLOOD CONTROL
	Arecibo, Puerto Rico
BORING NO.	CB-DC-15
BORING ELEV.	17.7 Ft., NGVD29
DATE	8/25/2003

SAJ FORM 2087
JUN 02



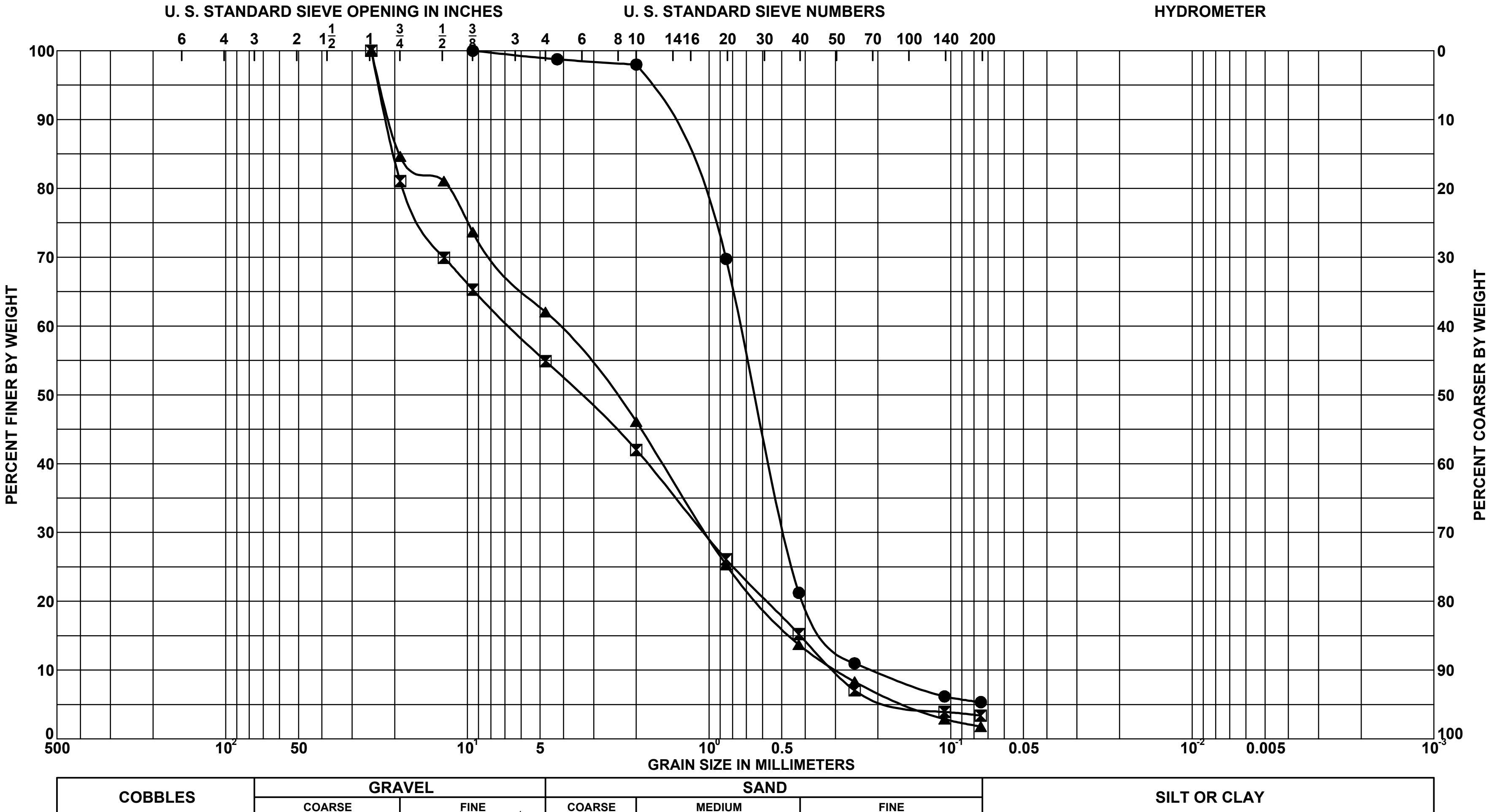
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.		Depth	Classification	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	5	6.0 to 7.5 Ft.	ML					42	33	9
⧗	8	10.5 to 12.0 Ft.	SM					0	0	NP

GRADATION CURVES

PROJECT	RIO GRANDE DE ARECIBO FLOOD CONTROL
	Arecibo, Puerto Rico
BORING NO.	CB-DC-16
BORING ELEV.	9.8 Ft., NGVD29
DATE	8/26/2003

SAJ FORM 2087
JUN 02

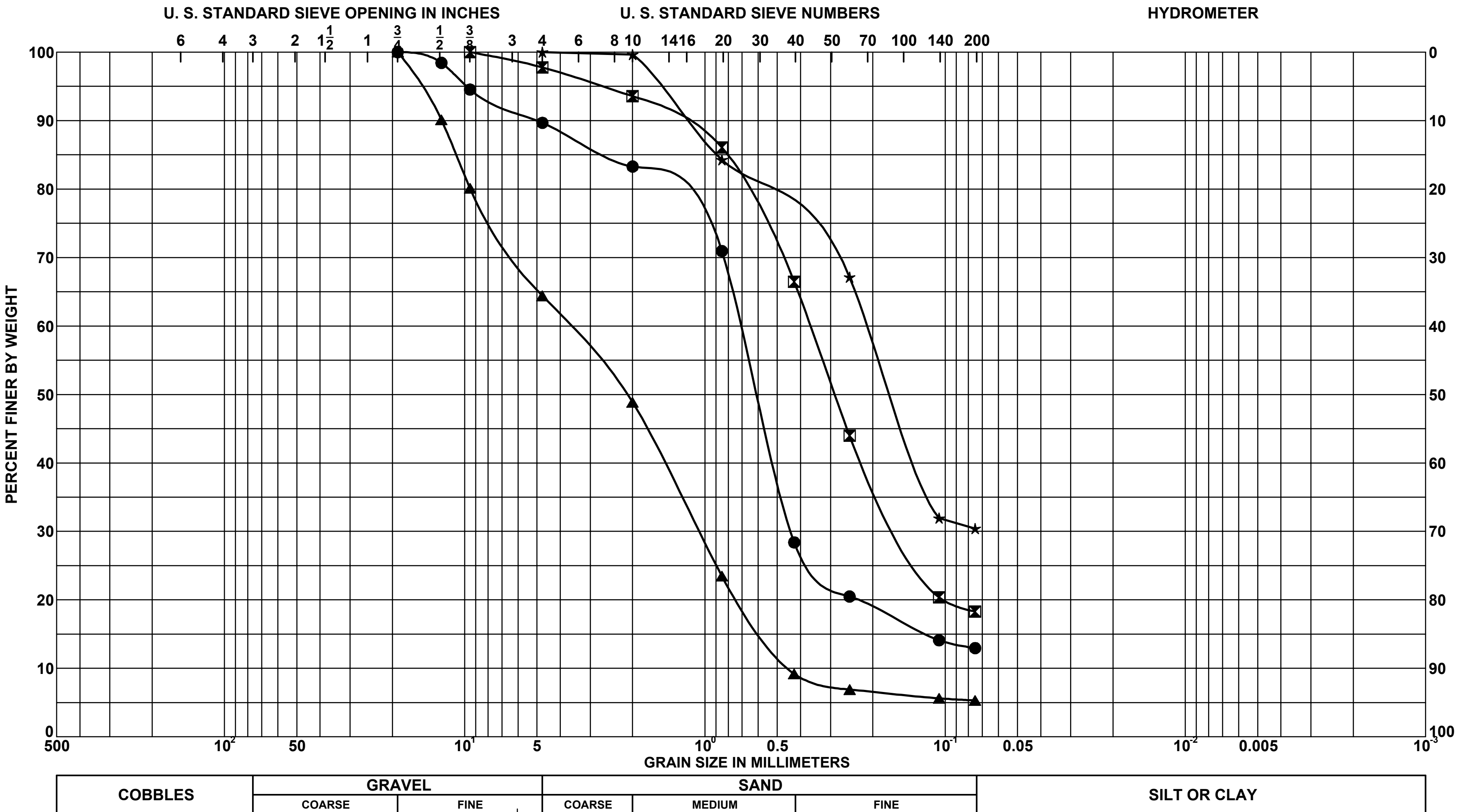


Sample No.		Depth	Classification	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	4	4.5 to 6.0 Ft.	SP-SM					0	0	NP
⧗	8	10.5 to 12.0 Ft.	SP					0	0	NP
▲	11	15.0 to 16.5 Ft.	SP					0	0	NP

GRADATION CURVES

PROJECT	RIO GRANDE DE ARECIBO FLOOD CONTROL
	Arecibo, Puerto Rico
BORING NO.	CB-DC-17
BORING ELEV.	10.5 Ft., NGVD29
DATE	8/25/2003

SAJ FORM 2087
JUN 02

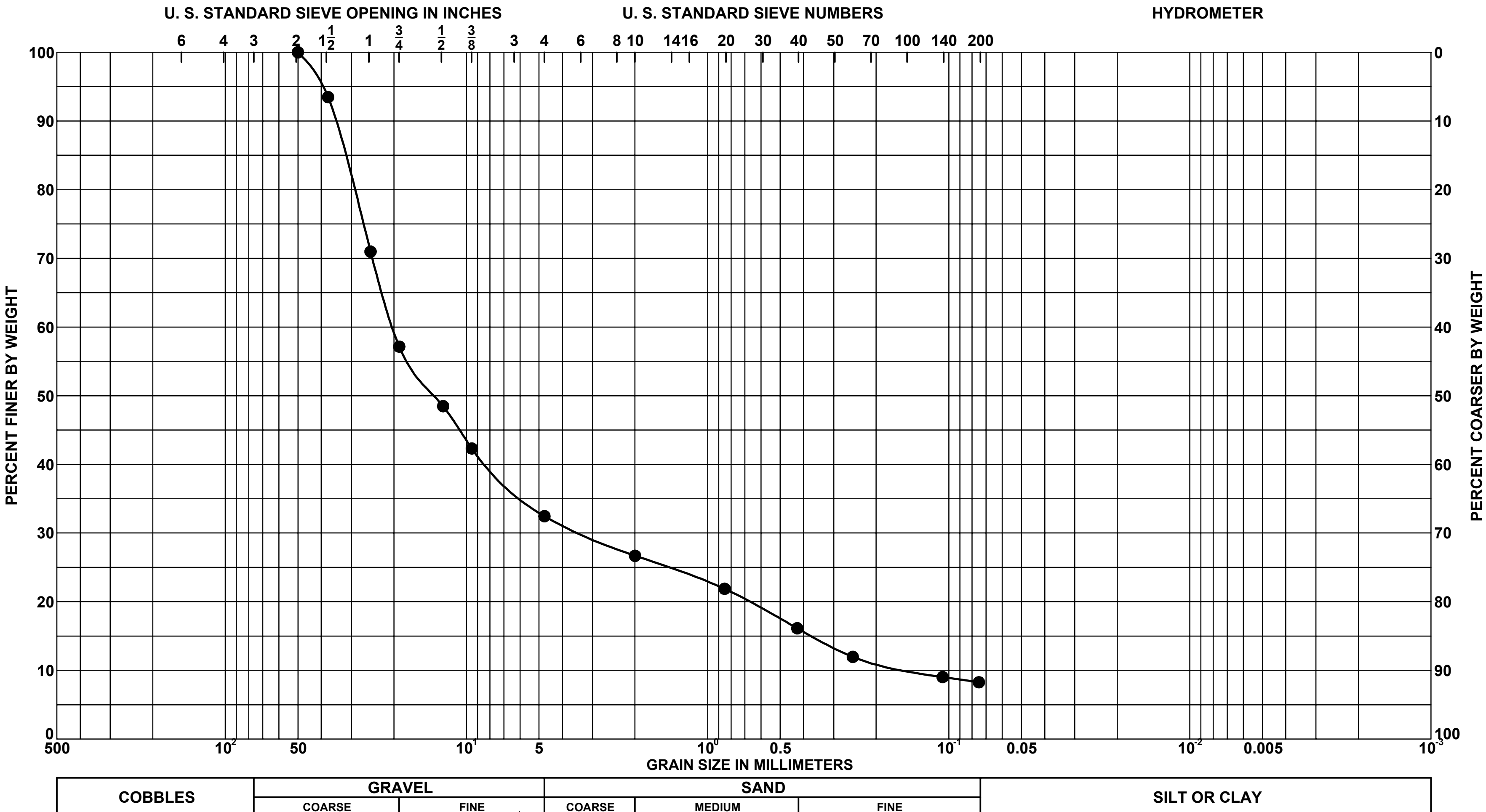


Sample No.		Depth	Classification	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	4	4.5 to 6.0 Ft.	SM					0	0	NP
⧗	8	10.5 to 12.0 Ft.	SM					0	0	NP
▲	14	19.5 to 21.0 Ft.	SP-SC					46	17	29
★	29	42.0 to 43.5 Ft.	SC					30	21	9

PROJECT	RIO GRANDE DE ARECIBO FLOOD CONTROL
	Arecibo, Puerto Rico
BORING NO.	CB-RGA-14A
BORING ELEV.	4.8 Ft., NGVD29
DATE	8/25/2003

GRADATION CURVES

SAJ FORM 2087
JUN 02

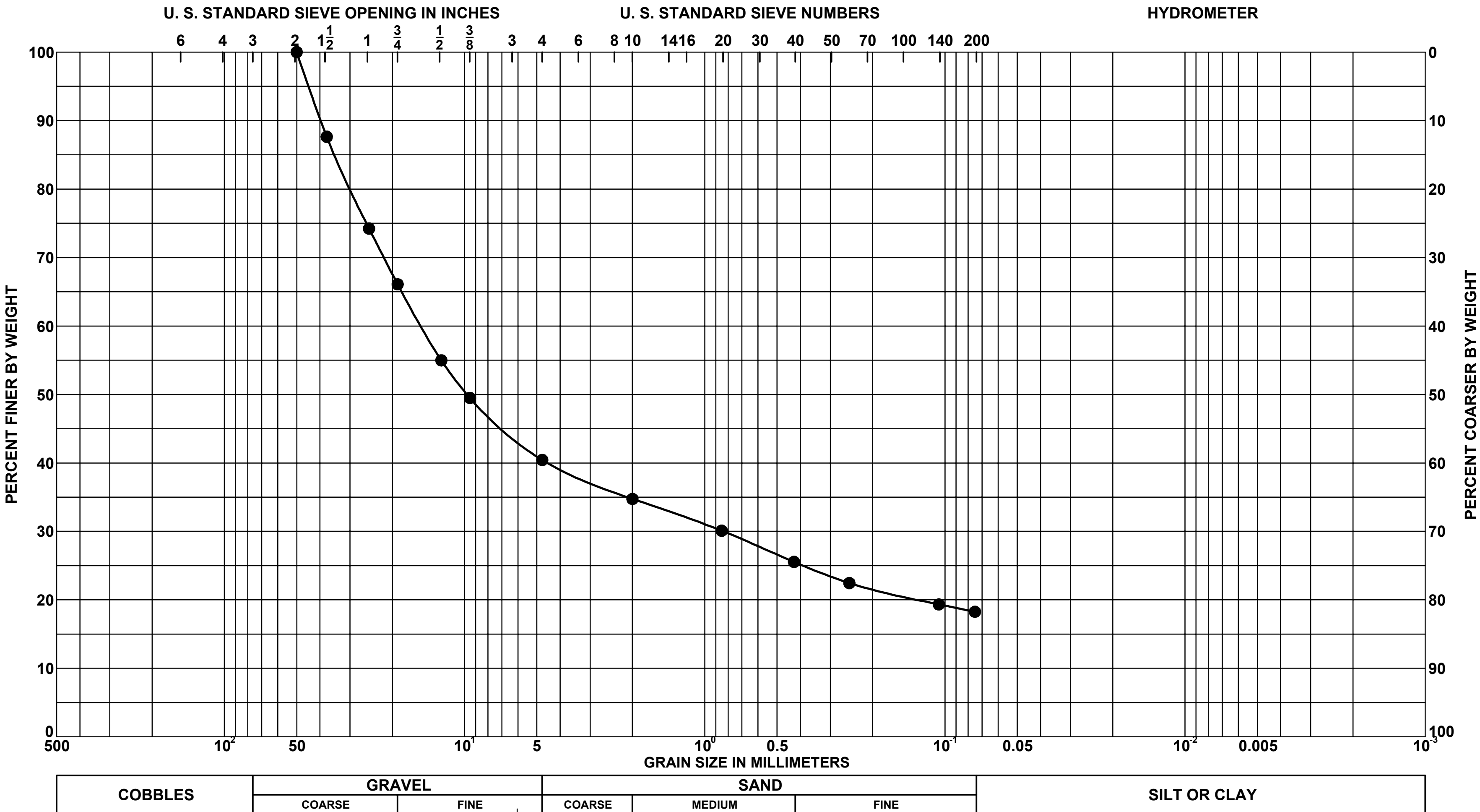


Sample No.	Depth	Classification	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	to 10.3 Ft.	GRAVEL, poorly-graded with silt, some fine to coarse-grained sand, mostly fine to coarse-grained sand, some gravel, some gravel (GP-GM)					0	0	NP

PROJECT	RIO GRANDE DE ARECIBO FLOOD CONTROL Arecibo, Puerto Rico
BORING NO.	TP-BA2-1
BORING ELEV.	165.6 Ft., NGVD29
DATE	8/23/2003

GRADATION CURVES

SAJ FORM 2087
JUN 02



Sample No.	Depth	Classification	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	to 10.2 Ft.	GRAVEL, silty, some fine to					0	0	NP
		coarse-grained sand, mostly							
		fine to coarse-grained sand,							
		some gravel, some gravel (GM)							

PROJECT RIO GRANDE DE ARECIBO FLOOD CONTROL
Arecibo, Puerto Rico

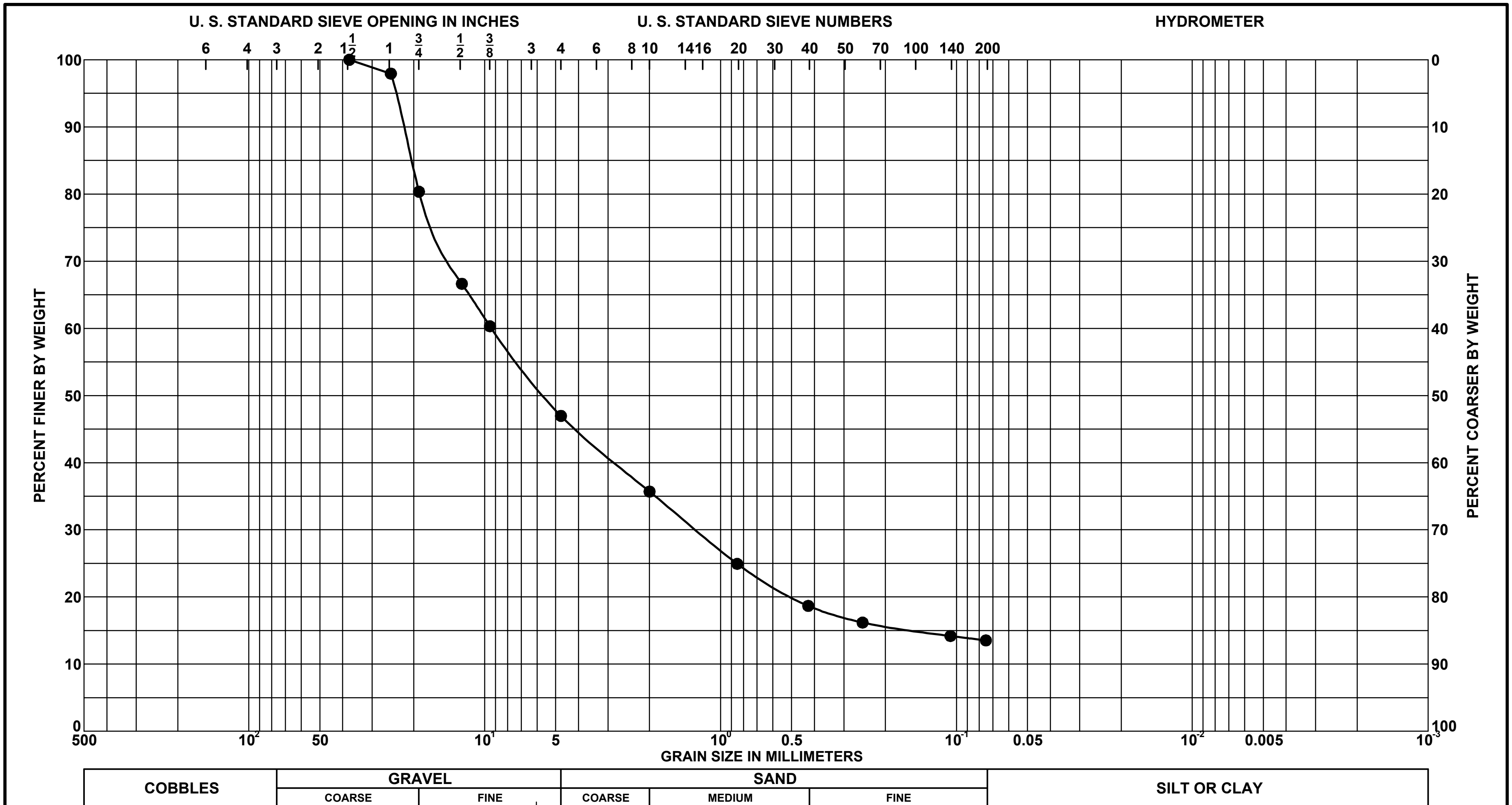
BORING NO. TP-BA2-2

BORING ELEV. 159.6 Ft., NGVD29

DATE 8/25/2003

GRADATION CURVES

SAJ FORM 2087
JUN 02

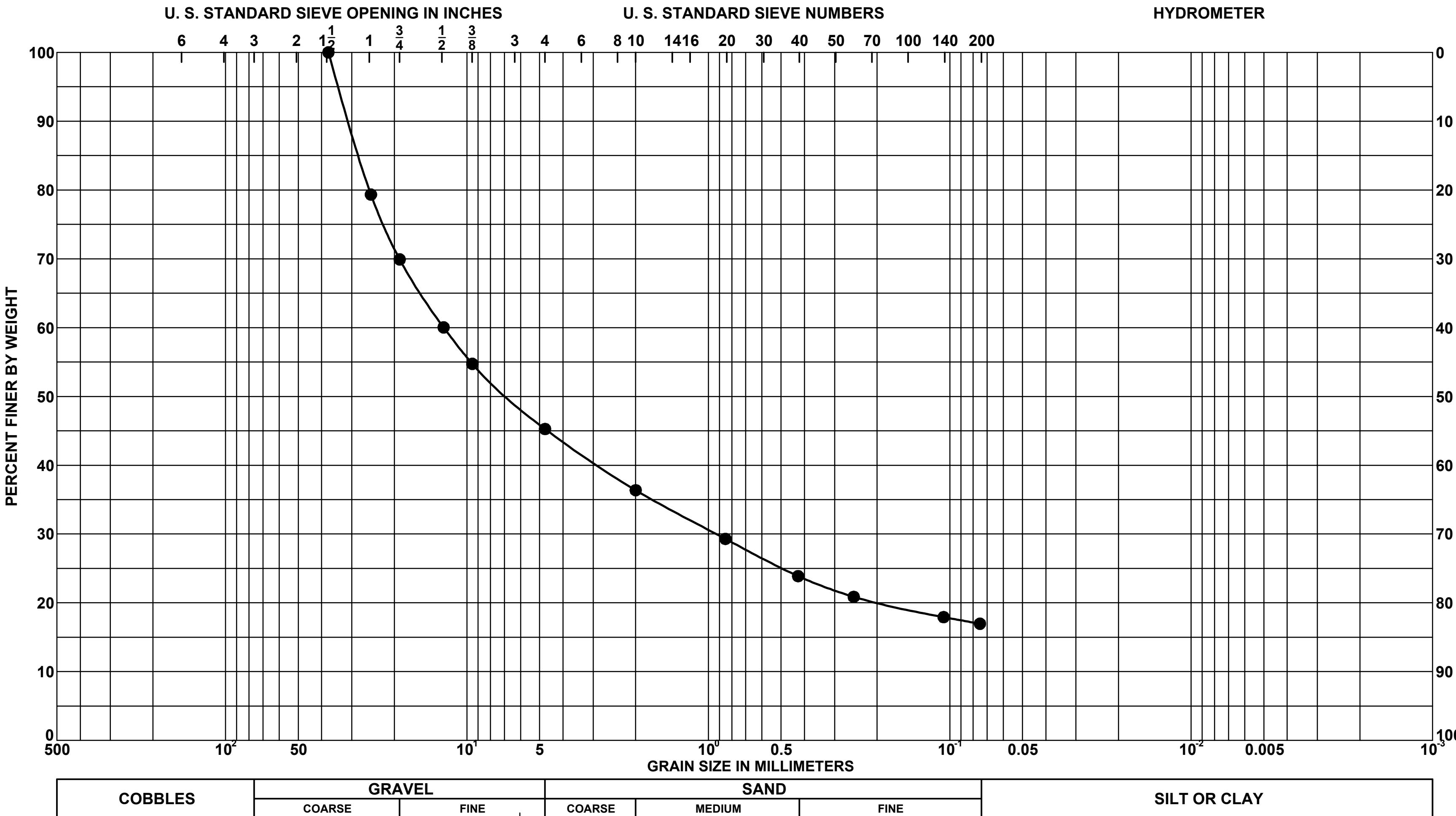


Sample No.	Depth	Classification	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	to 10.0 Ft.	GRAVEL, silty, some fine to coarse-grained sand, mostly fine to coarse-grained sand, some gravel, some fine to coarse-grained sand (GM)					0	0	NP

PROJECT	RIO GRANDE DE ARECIBO FLOOD CONTROL Arecibo, Puerto Rico
BORING NO.	TP-BA2-3
BORING ELEV.	199.6 Ft., NGVD29
DATE	8/23/2003

GRADATION CURVES

SAJ FORM 2087
JUN 02

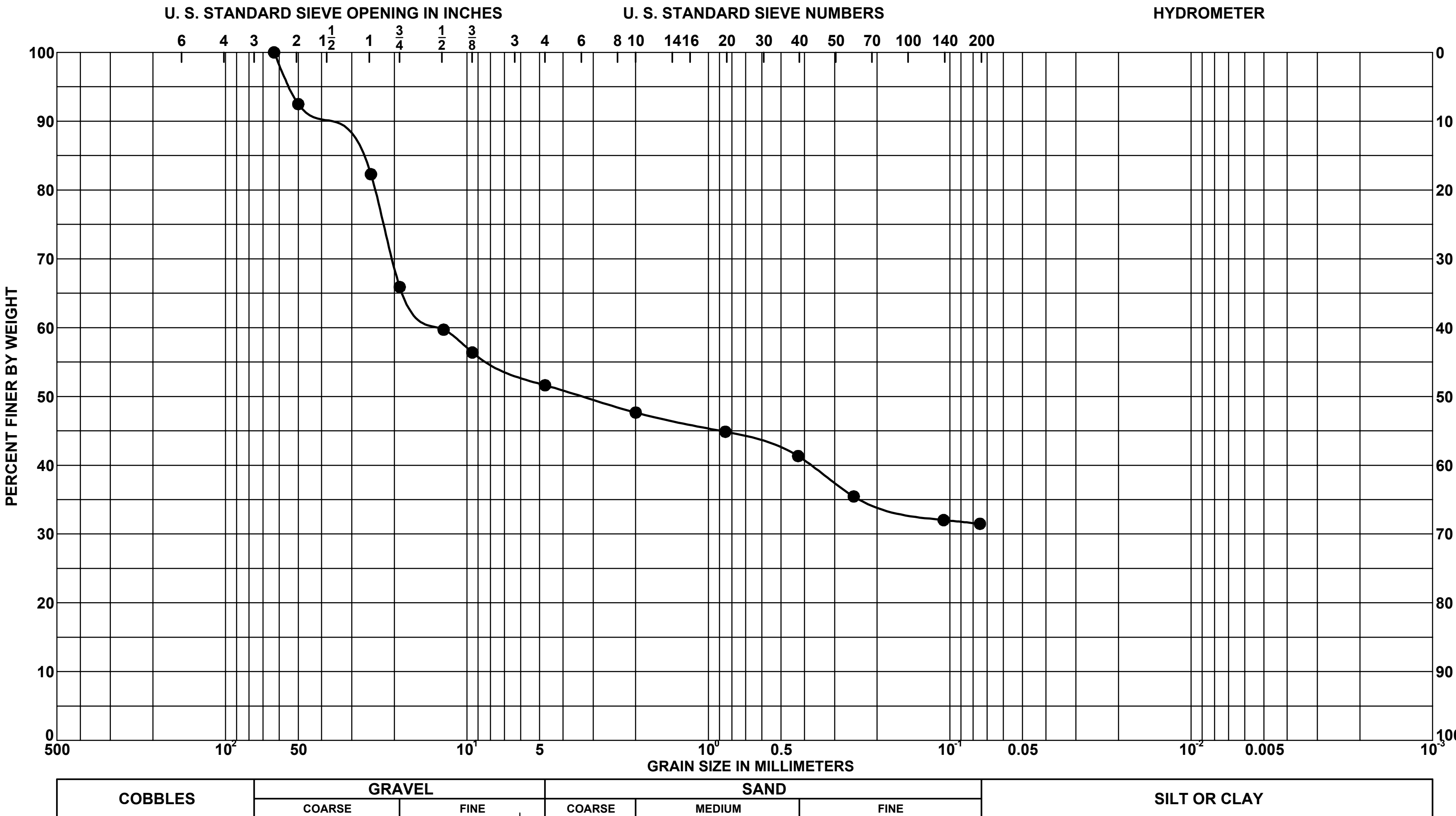


Sample No.	Depth	Classification	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	to 10.5 Ft.	GRAVEL, silty, some fine to coarse-grained sand, mostly fine to coarse-grained sand, some gravel, some gravel (GM)					0	0	NP

PROJECT	RIO GRANDE DE ARECIBO FLOOD CONTROL
	Arecibo, Puerto Rico
BORING NO.	TP-BA2-4
BORING ELEV.	163.2 Ft., NGVD29
DATE	8/22/2003

GRADATION CURVES

SAJ FORM 2087
JUN 02

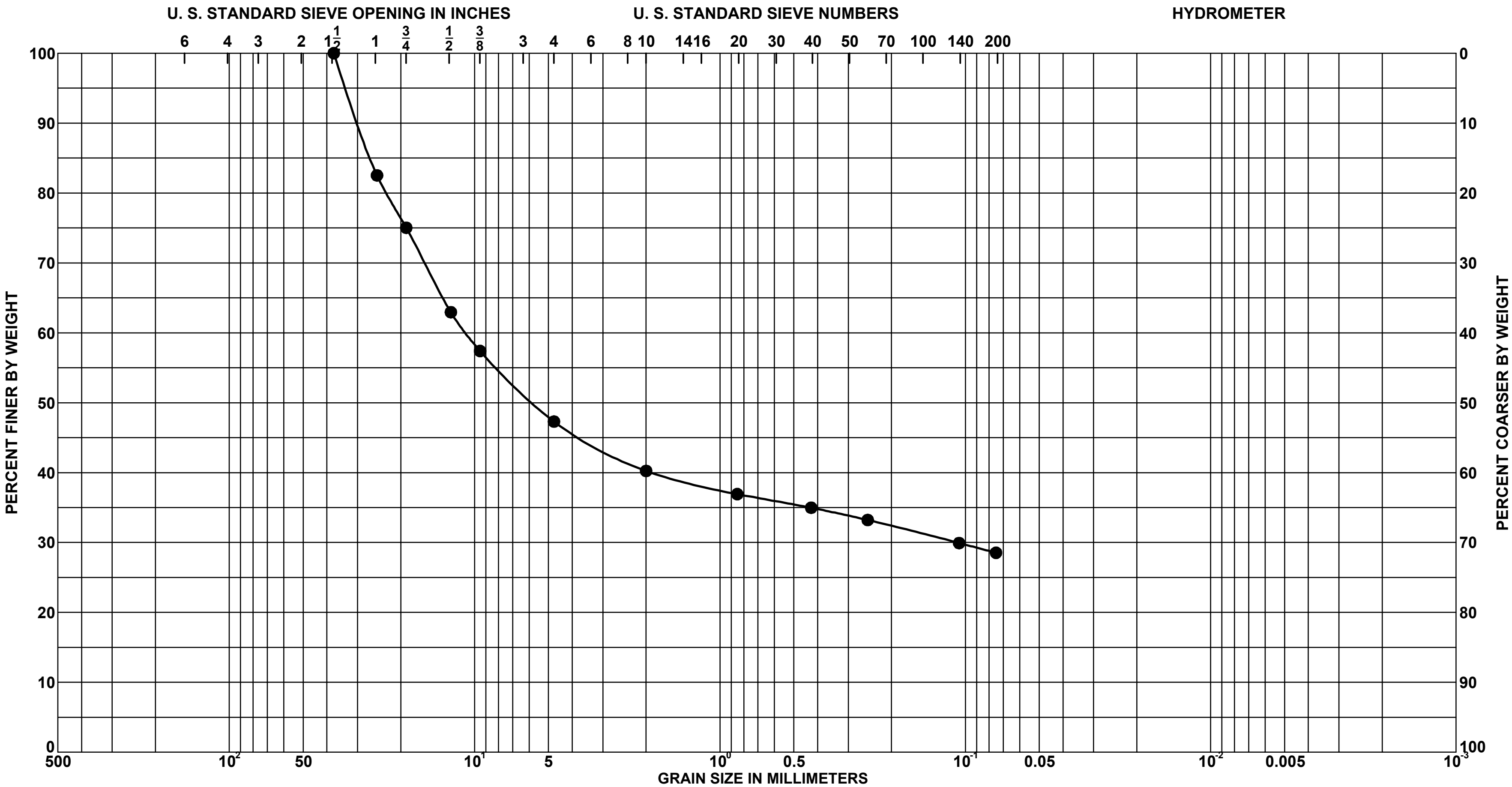


Sample No.	Depth	Classification	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	to 5.2 Ft.	GRAVEL, clayey, some fines,					46	19	27
		mostly fine to coarse-grained							
		sand, some gravel, some gravel							
		(GC)							

PROJECT	RIO GRANDE DE ARECIBO FLOOD CONTROL
	Arecibo, Puerto Rico
BORING NO.	TP-BA2-5
BORING ELEV.	68.0 Ft., NGVD29
DATE	8/27/2003

GRADATION CURVES

SAJ FORM 2087
JUN 02



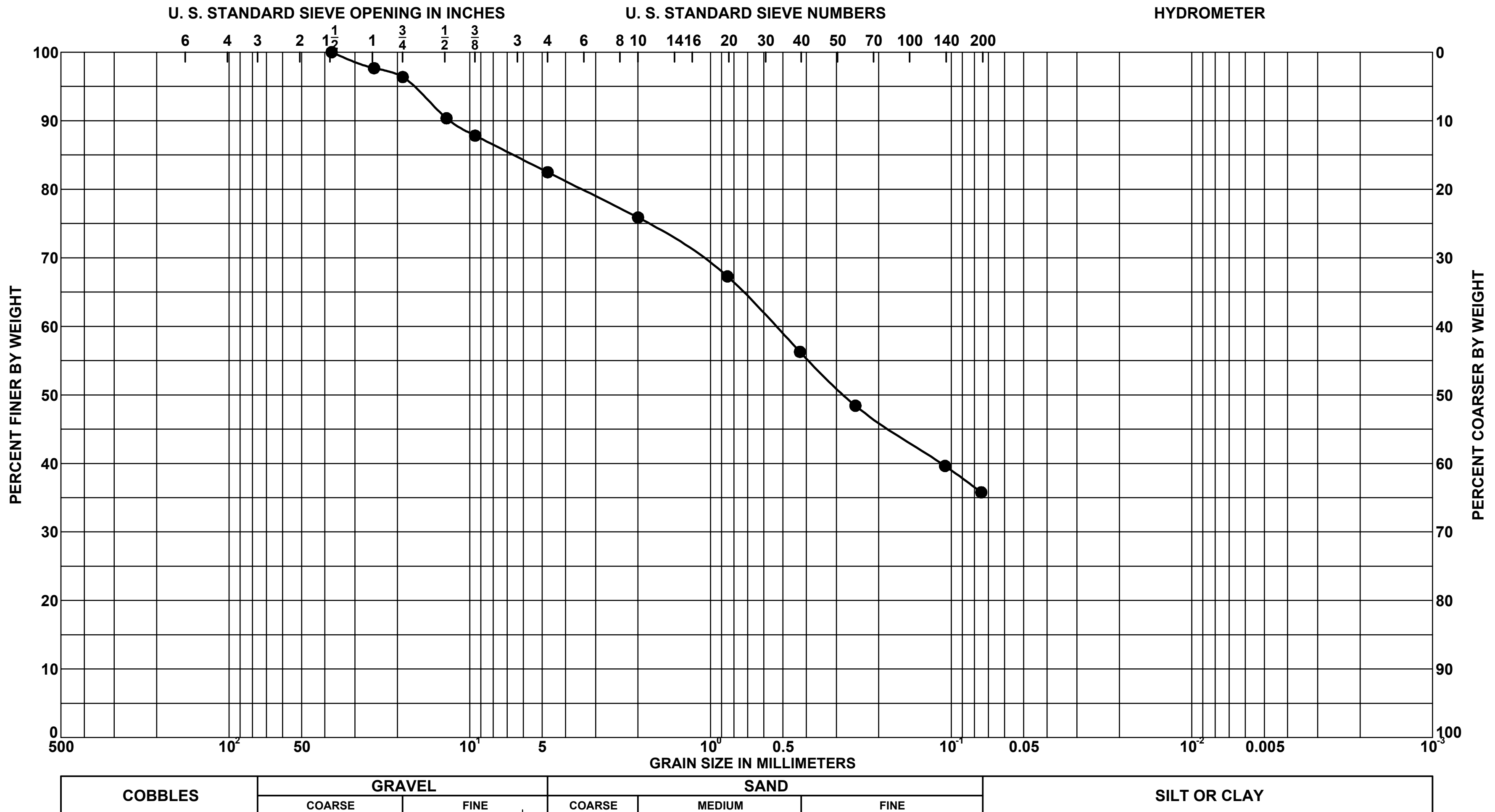
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Depth	Classification	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	to 6.2 Ft.	GRAVEL, clayey, some fine to					35	21	14
		coarse-grained sand, mostly							
		fine to coarse-grained sand,							
		some gravel, some gravel (GC)							

PROJECT	RIO GRANDE DE ARECIBO FLOOD CONTROL
	Arecibo, Puerto Rico
BORING NO.	TP-BA2-6
BORING ELEV.	172.4 Ft., NGVD29
DATE	8/25/2003

GRADATION CURVES

SAJ FORM 2087
JUN 02



Sample No.	Depth	Classification	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	to 11.3 Ft.	SAND, silty, some fine to					0	0	NP
		coarse-grained sand, mostly							
		fine to coarse-grained sand,							
		some fines, some fine to							
		coarse-grained sand (SM)							

PROJECT RIO GRANDE DE ARECIBO FLOOD CONTROL
Arecibo, Puerto Rico

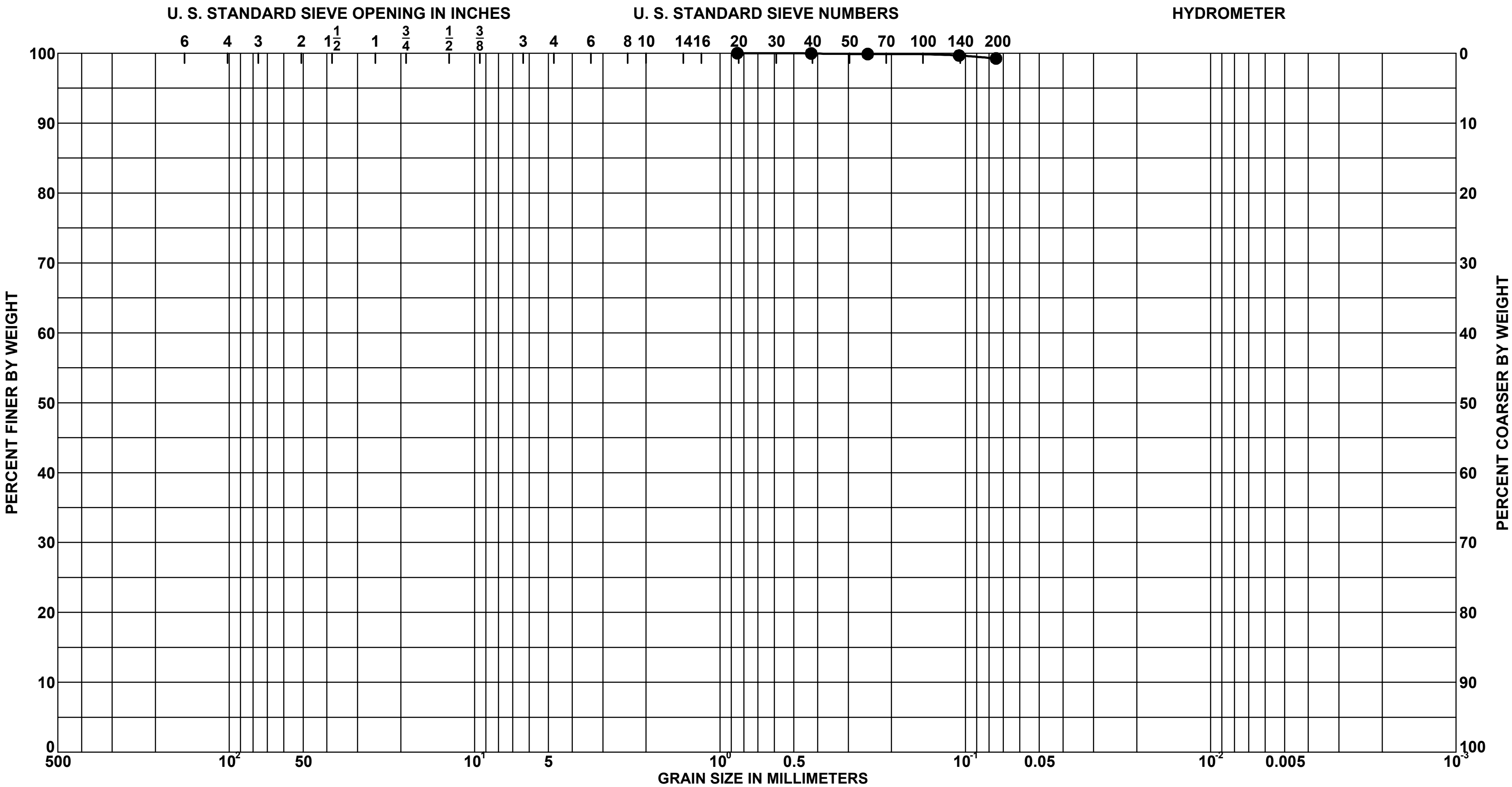
BORING NO. TP-BA2-7

BORING ELEV. 169.7 Ft., NGVD29

DATE 8/22/2003

GRADATION CURVES

SAJ FORM 2087
JUN 02



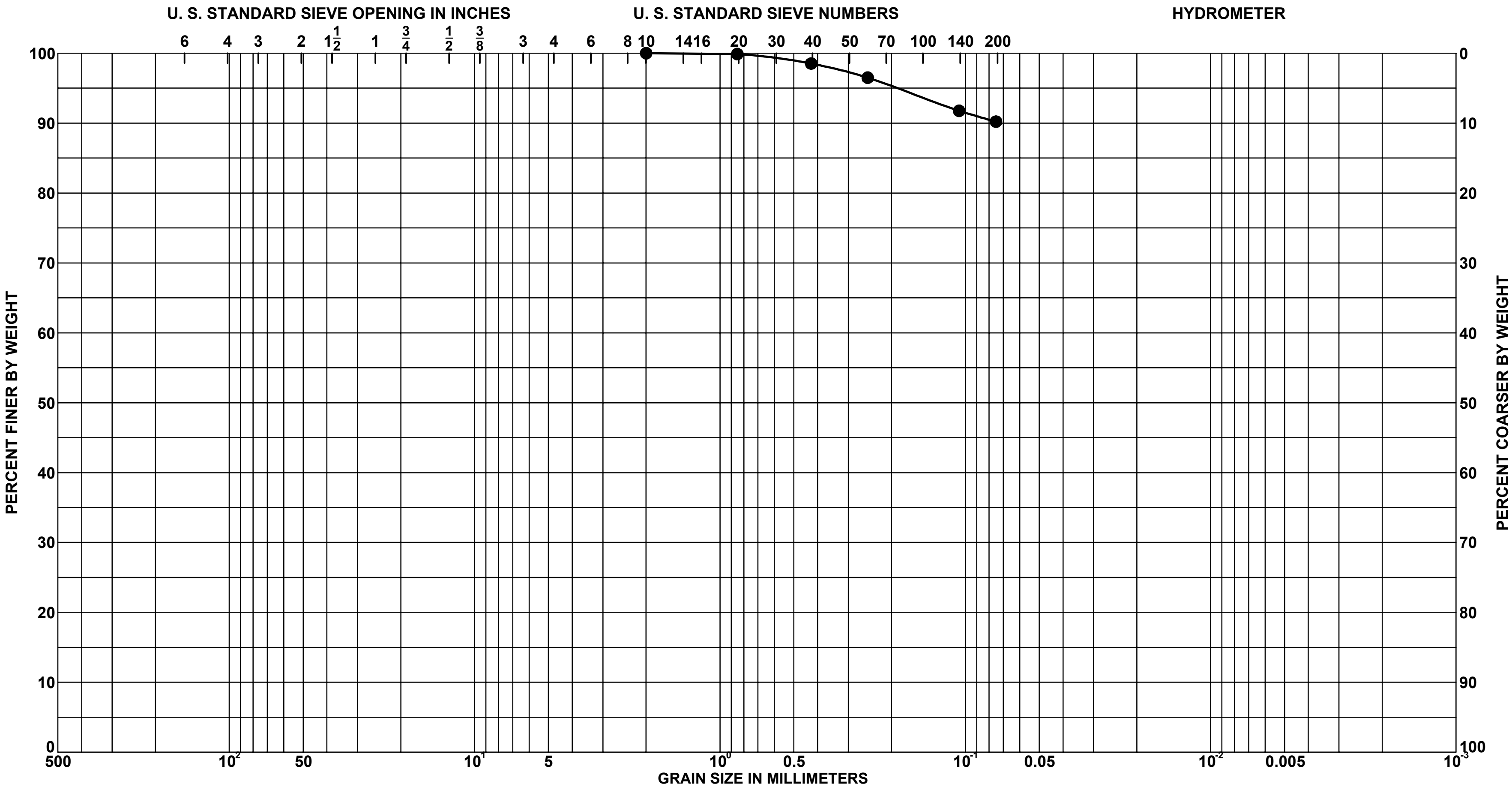
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Depth	Classification	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	to 11.0 Ft.	SILT, inorganic-H, trace					58	32	26
		fine-grained sand (MH)							

PROJECT	RIO GRANDE DE ARECIBO FLOOD CONTROL
	Arecibo, Puerto Rico
BORING NO.	TP-DC-1
BORING ELEV.	20.2 Ft., NGVD29
DATE	8/21/2003

GRADATION CURVES

SAJ FORM 2087
JUN 02



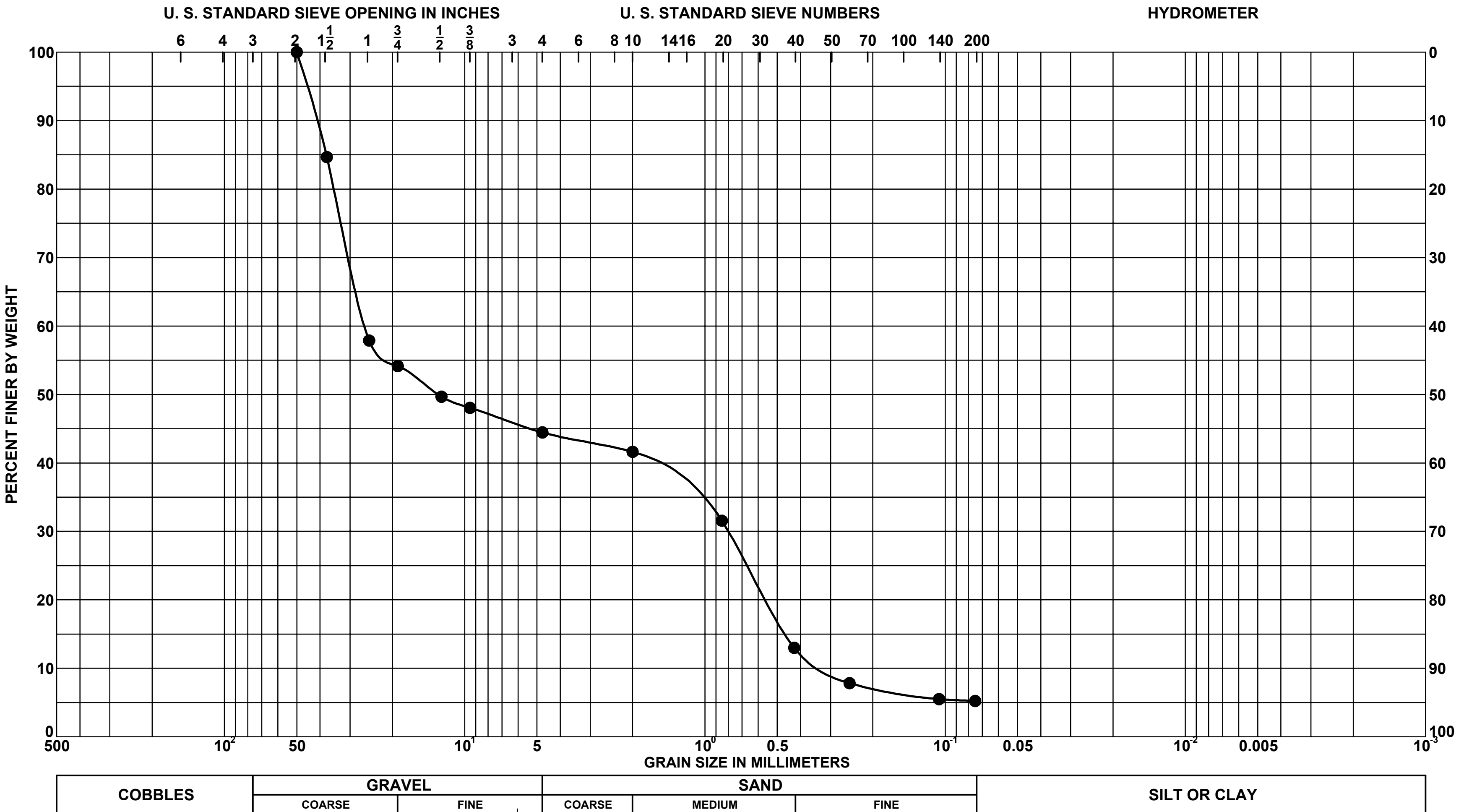
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Depth	Classification	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	to 10.3 Ft.	SILT, inorganic-L, little fine to					46	28	18
		medium-grained sand (ML)							

PROJECT	RIO GRANDE DE ARECIBO FLOOD CONTROL
	Arecibo, Puerto Rico
BORING NO.	TP-DC-2
BORING ELEV.	15.4 Ft., NGVD29
DATE	8/21/2003

GRADATION CURVES

SAJ FORM 2087
JUN 02

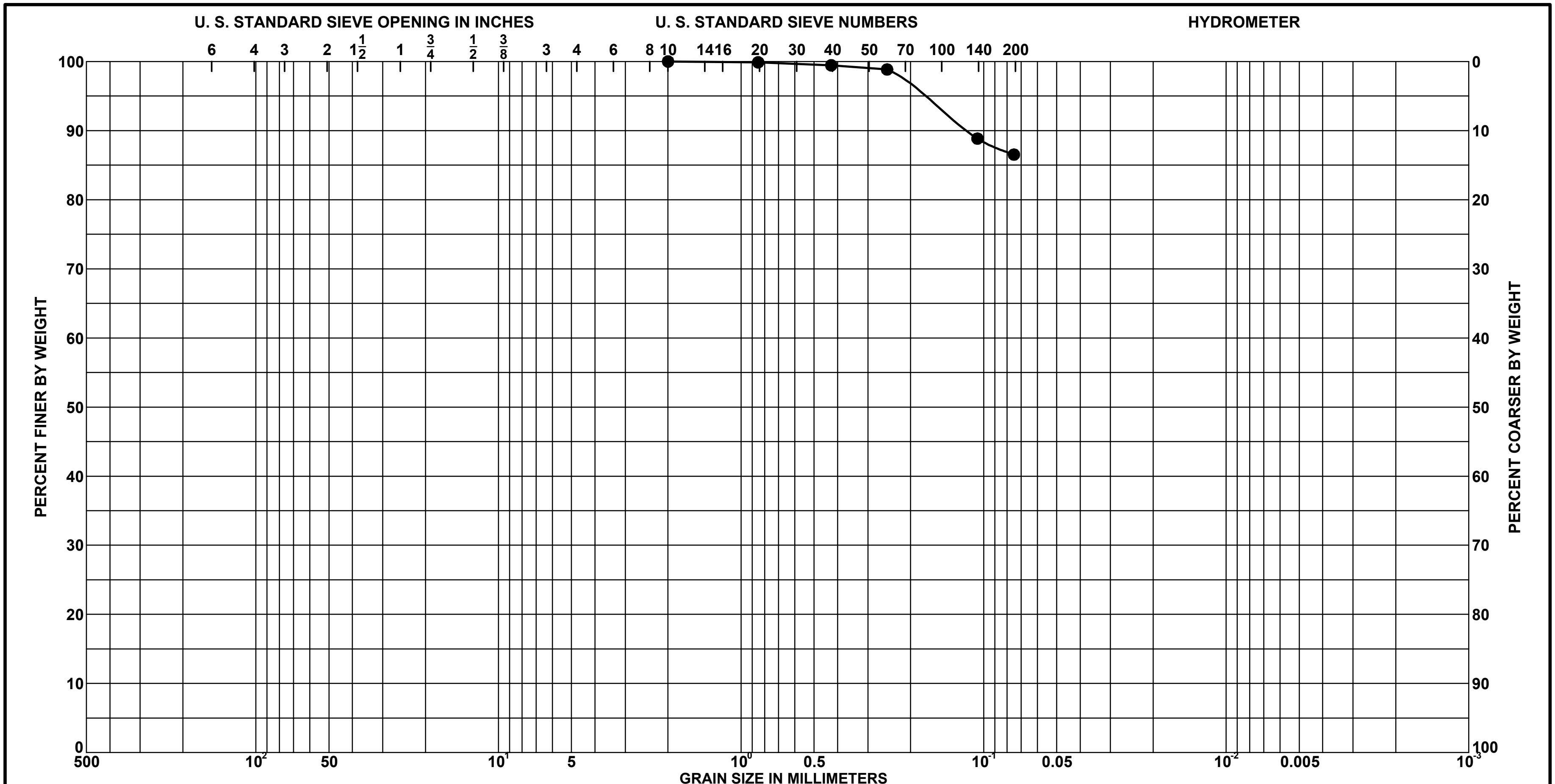


Sample No.	Depth	Classification	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	to 10.8 Ft.	GRAVEL, poorly-graded with					0	0	NP
		silt, some fine to							
		medium-grained sand, mostly							
		fine to medium-grained sand,							
		some gravel, some gravel							
		(GP-GM)							

GRADATION CURVES

PROJECT	RIO GRANDE DE ARECIBO FLOOD CONTROL
	Arecibo, Puerto Rico
BORING NO.	TP-DC-3
BORING ELEV.	16.9 Ft., NGVD29
DATE	8/21/2003

SAJ FORM 2087
JUN 02



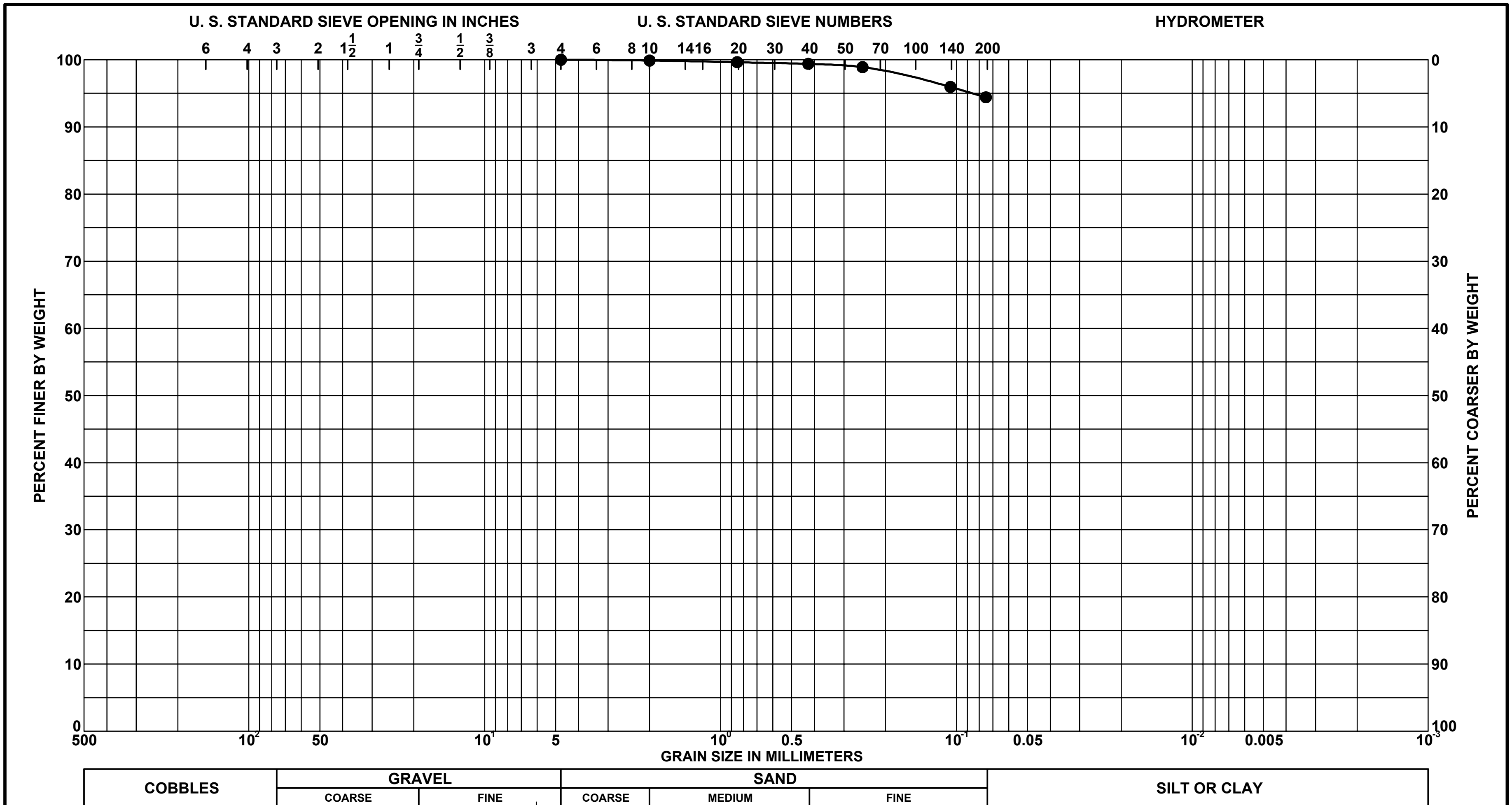
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Depth	Classification	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	to 10.2 Ft.	SILT, inorganic-L, little					46	33	13
		fine-grained sand (ML)							

PROJECT RIO GRANDE DE ARECIBO FLOOD CONTROL
Arecibo, Puerto Rico
BORING NO. TP-DC-4
BORING ELEV. 12.6 Ft., NGVD29
DATE 8/20/2003

GRADATION CURVES

SAJ FORM 2087
JUN 02



Sample No.	Depth	Classification	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	to 9.2 Ft.	SILT, inorganic-H, few fine to medium-grained sand (MH)					53	33	20

GRADATION CURVES

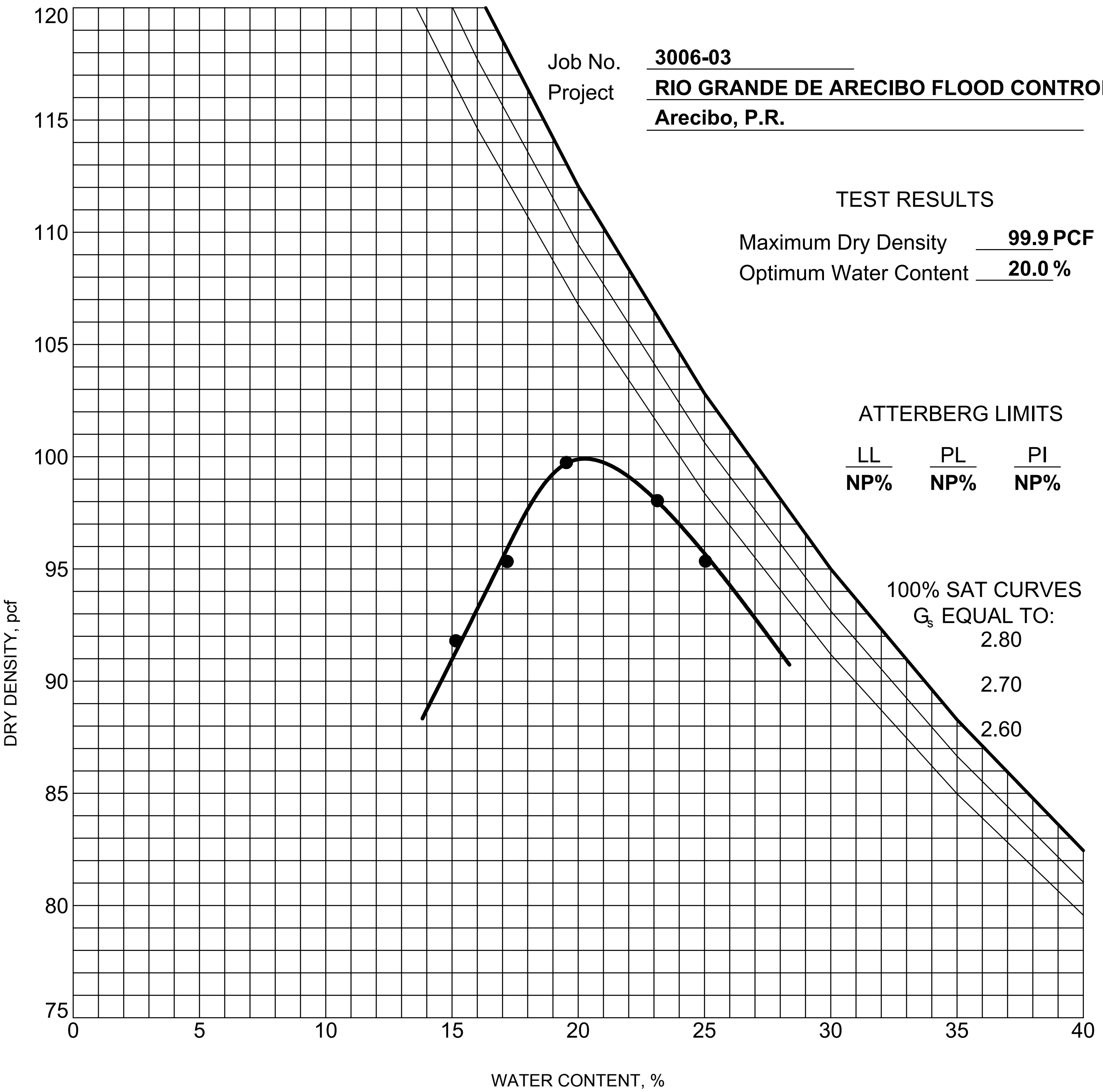
PROJECT	RIO GRANDE DE ARECIBO FLOOD CONTROL
	Arecibo, Puerto Rico
BORING NO.	TP-DC-5
BORING ELEV.	10.2 Ft., NGVD29
DATE	8/22/2003

SAJ FORM 2087
JUN 02

Job No. **3006-03**

Project **RIO GRANDE DE ARECIBO FLOOD CONTROL**

Arecibo, P.R.



TEST RESULTS

Maximum Dry Density **99.9** PCF

Optimum Water Content **20.0** %

ATTERBERG LIMITS

LL	PL	PI
NP%	**NP%**	**NP%**

Sample	Description	ASTM	AASHTO
TP-BA2-1 8.67 ft	**POORLY GRADED GRAVEL with SILT and SAND**	**GP-GM**	**A-1-a**

Test Method	Nat. Moist.	% > No. 4 sieve	% < No. 200 sieve
ASTM D 698B	**6.0%**	**67.5**	**8.3**

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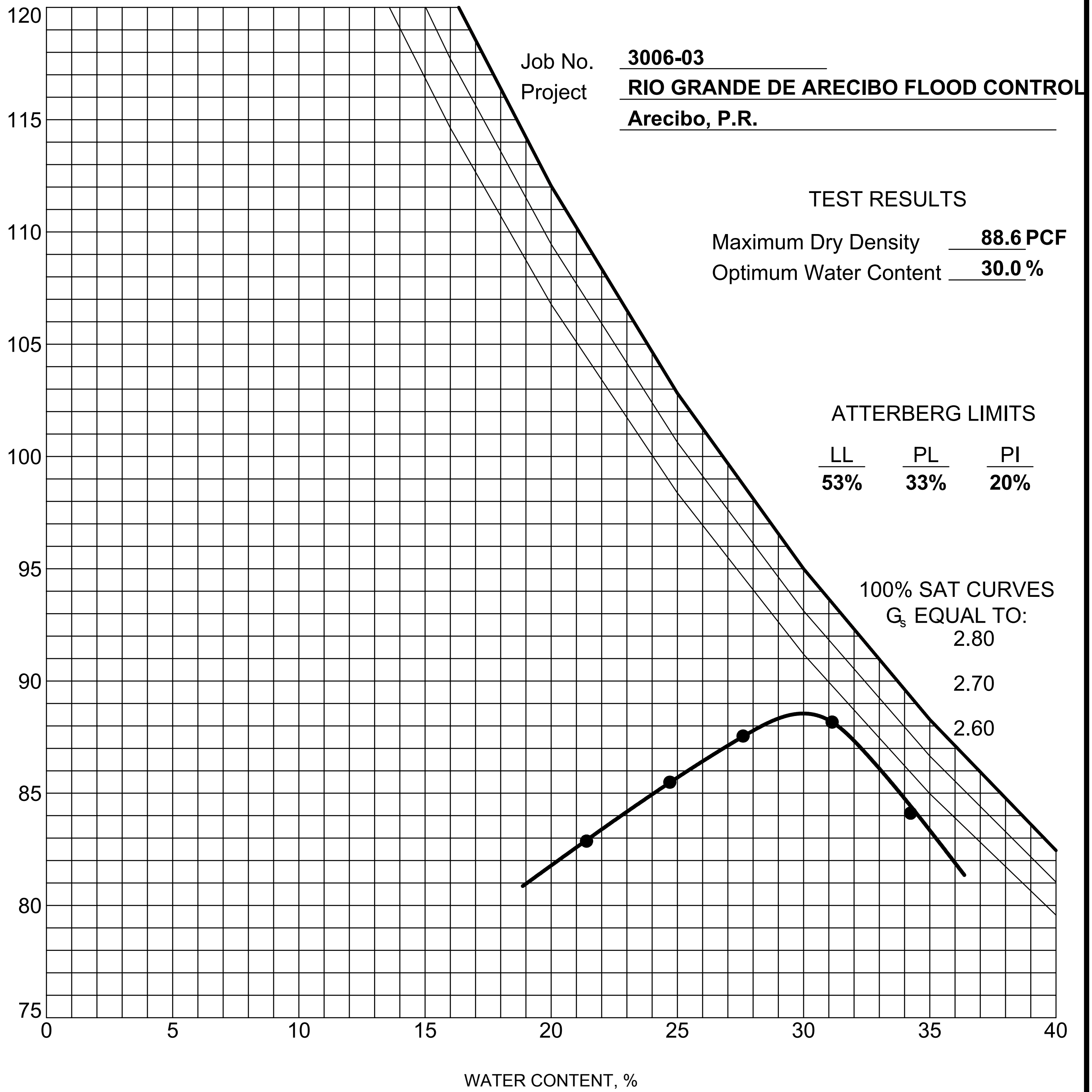
MOISTURE-DENSITY RELATIONSHIP

Project: RIO GRANDE DE ARECIBO FLOOD CONTROL

Location: Arecibo, P.R.

Project No: 3006-03



Sample	Description	ASTM	AASHTO
TP-DC-5 4.0 ft	**ELASTIC SILT**	**MH**	**A-7-5**

Test Method	Nat. Moist.	% > No. 4 sieve	% < No. 200 sieve
ASTM D 698A	**32.0%**	**0.0**	**94.4**

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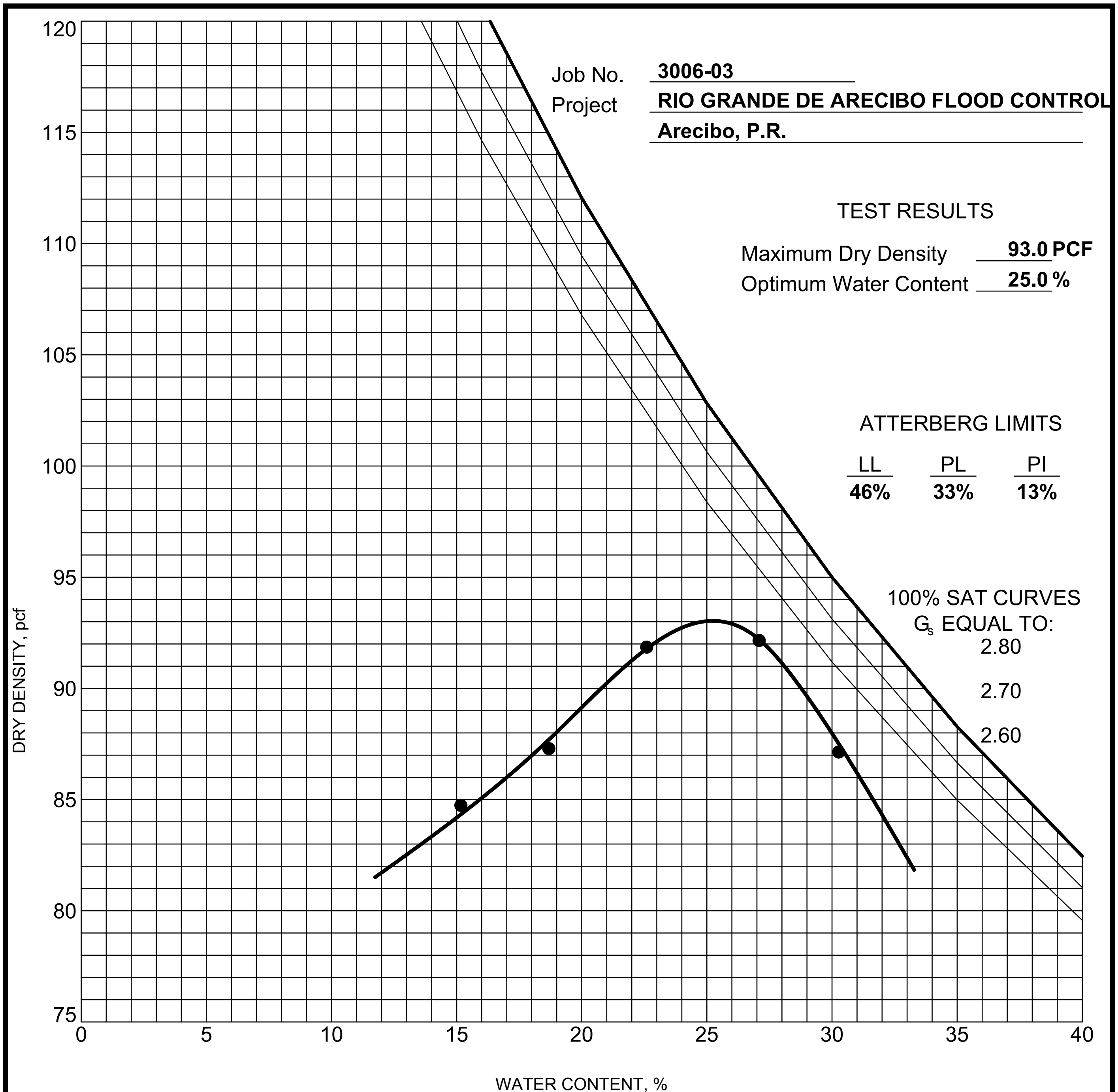
MOISTURE-DENSITY RELATIONSHIP

Project: RIO GRANDE DE ARECIBO FLOOD CONTROL

Location: Arecibo, P.R.

Project No: 3006-03



Sample	Description	ASTM	AASHTO
TP-DC-4 6.5 ft	**SILT**	**ML**	**A-7-5**

Test Method	Nat. Moist.	% > No. 4 sieve	% < No. 200 sieve
ASTM D 698A	**28.0%**	**0.0**	**86.5**

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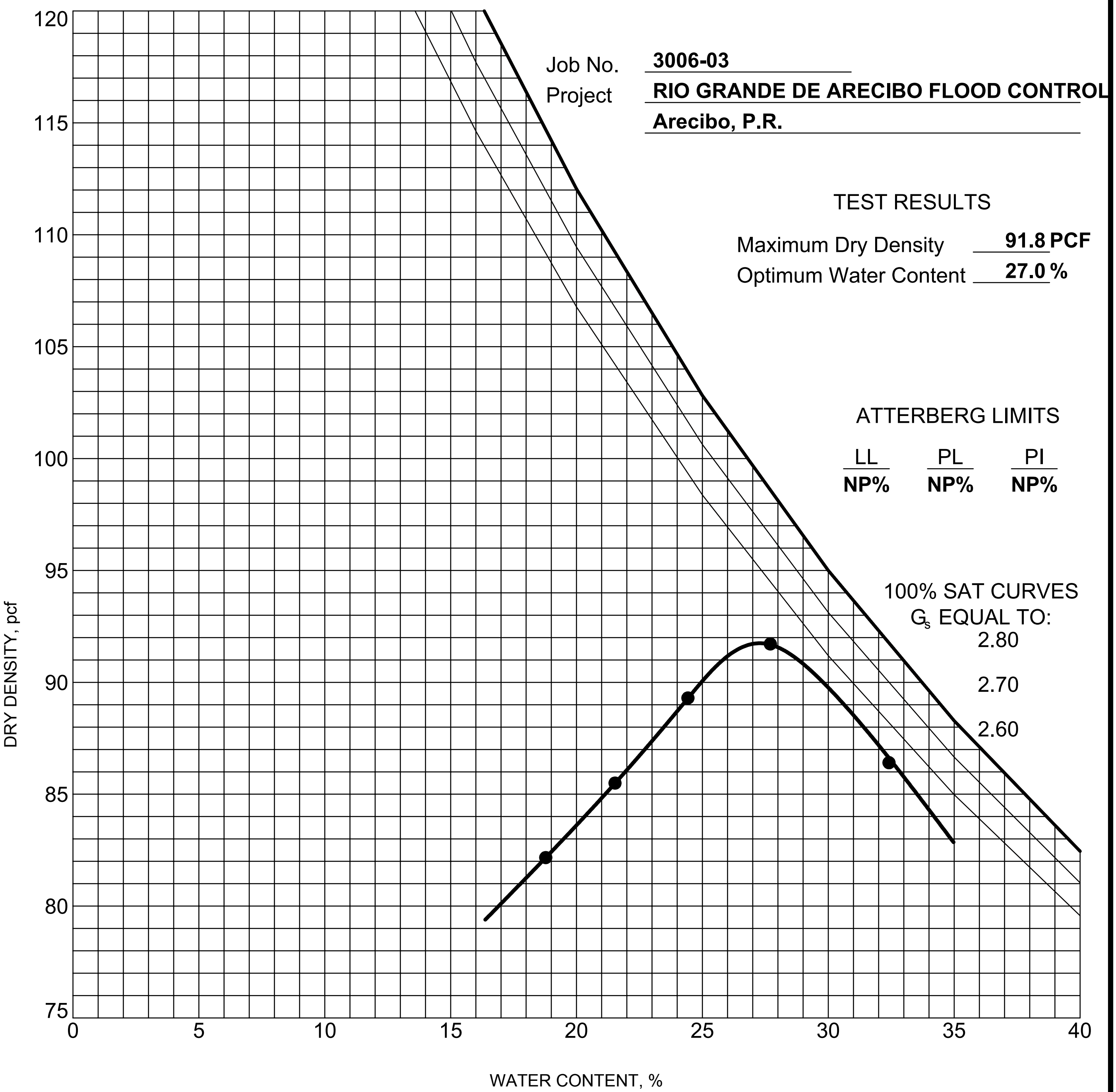
MOISTURE-DENSITY RELATIONSHIP

Project: RIO GRANDE DE ARECIBO FLOOD CONTROL
Location: Arecibo, P.R.
Project No: 3006-03



Sample	Description	ASTM	AASHTO
TP-DC-3 6.0 ft	**POORLY GRADED GRAVEL with SILT and SAND**	**GP-GM**	**A-1-a**

Test Method	Nat. Moist.	% > No. 4 sieve	% < No. 200 sieve
ASTM D 698B	**3.0%**	**55.6**	**5.2**

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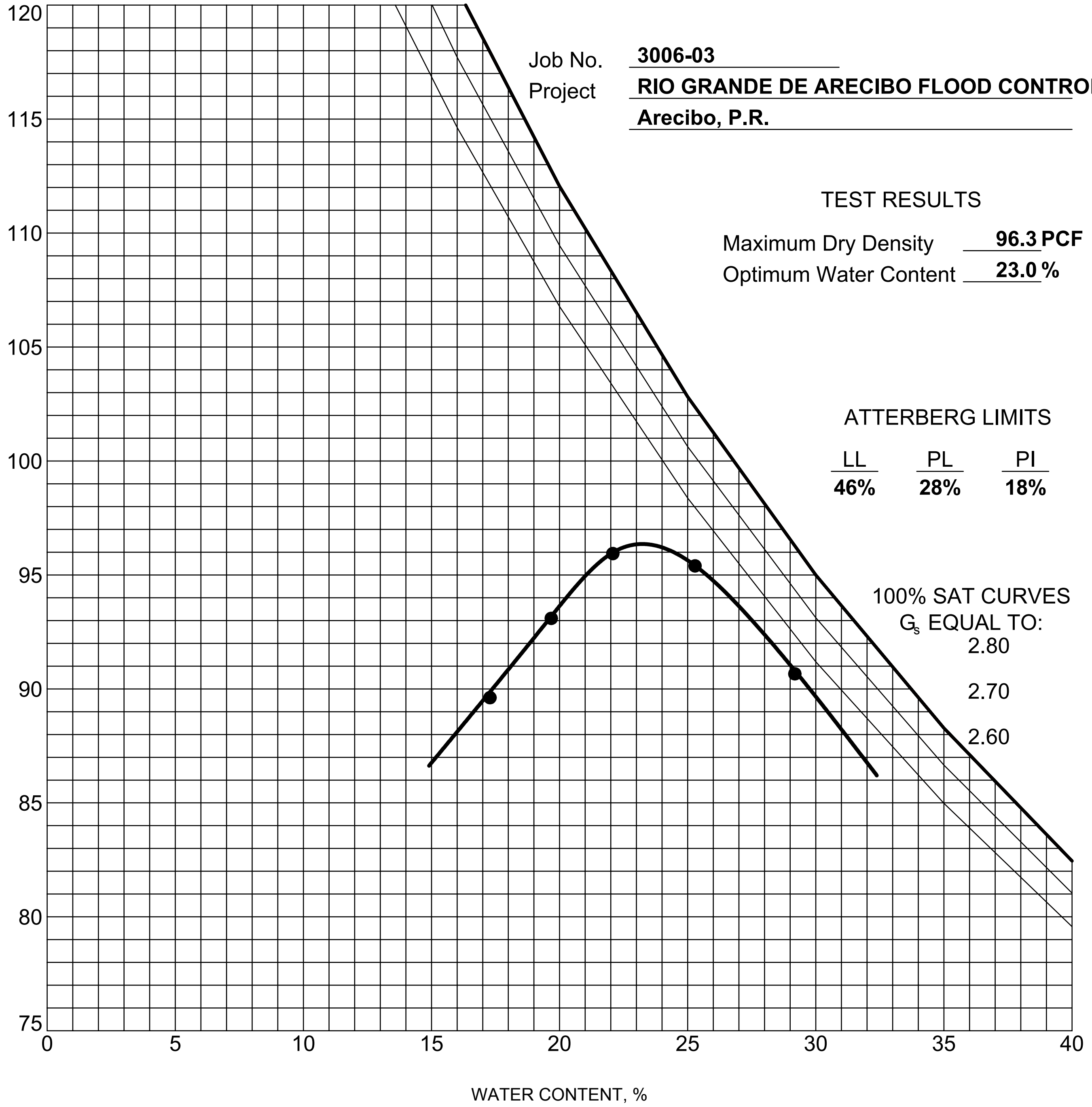
MOISTURE-DENSITY RELATIONSHIP

Project: RIO GRANDE DE ARECIBO FLOOD CONTROL
Location: Arecibo, P.R.
Project No: 3006-03



Job No. **3006-03**

Project **RIO GRANDE DE ARECIBO FLOOD CONTROL**

Arecibo, P.R.

TEST RESULTS

Maximum Dry Density **96.3** PCF

Optimum Water Content **23.0** %

ATTERBERG LIMITS

LL	PL	PI
46%	**28%**	**18%**

Sample	Description	ASTM	AASHTO
TP-DC-2 6.5 ft	**SILT**	**ML**	**A-7-6**

Test Method	Nat. Moist.	% > No. 4 sieve	% < No. 200 sieve
ASTM D 698A	**27.0%**	**0.0**	**90.2**

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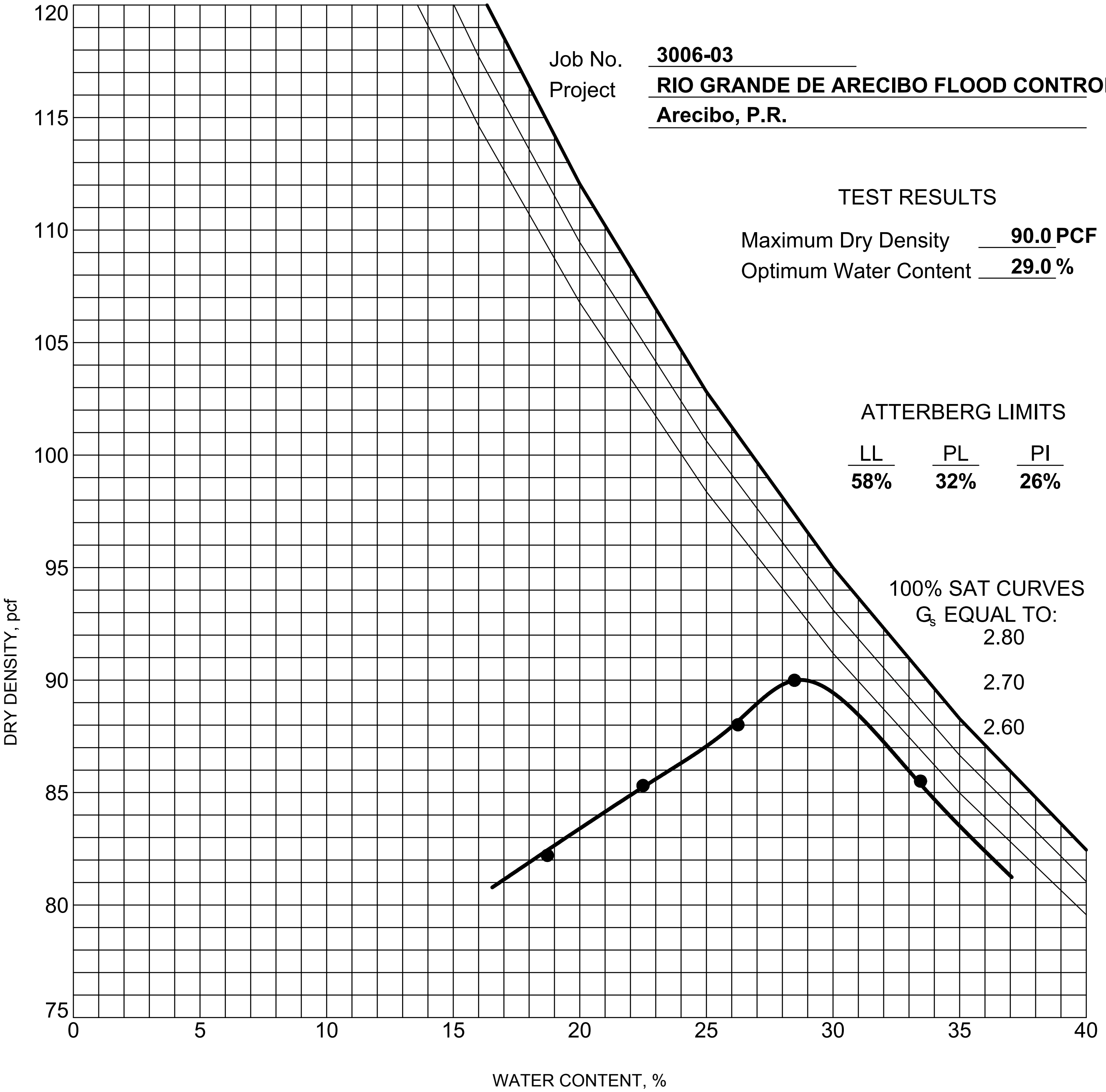
MOISTURE-DENSITY RELATIONSHIP

Project: RIO GRANDE DE ARECIBO FLOOD CONTROL

Location: Arecibo, P.R.

Project No: 3006-03

Job No. 3006-03
Project RIO GRANDE DE ARECIBO FLOOD CONTROL
Arecibo, P.R.



TEST RESULTS

Maximum Dry Density **90.0** PCF
Optimum Water Content **29.0** %

ATTERBERG LIMITS

LL	PL	PI
58%	**32%**	**26%**

Sample	Description	ASTM	AASHTO
TP-DC-1 7.0 ft	**ELASTIC SILT**	**MH**	**A-7-5**

Test Method	Nat. Moist.	% > No. 4 sieve	% < No. 200 sieve
ASTM D 698A	**31.0%**	**0.0**	**99.2**

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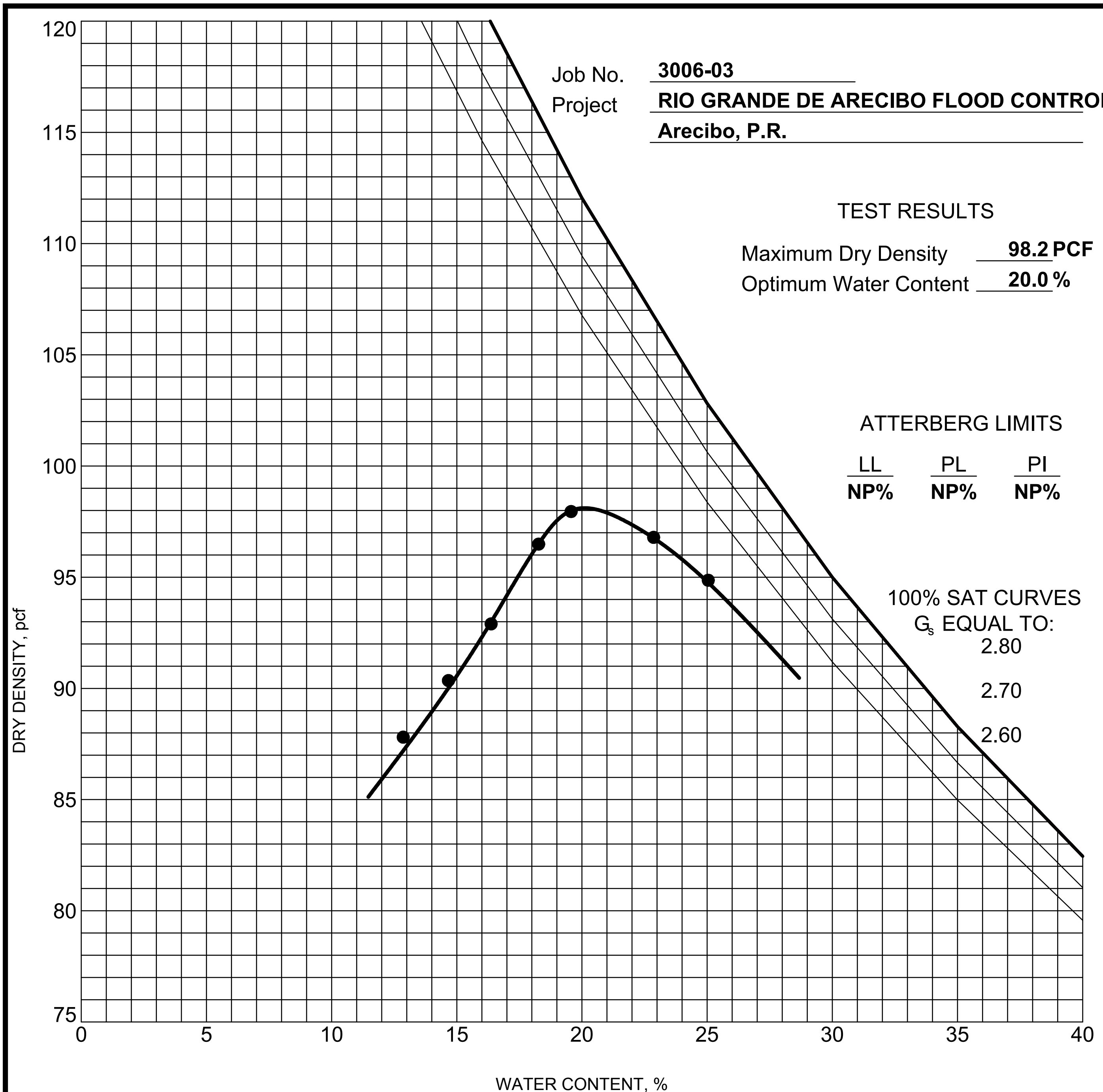
MOISTURE-DENSITY RELATIONSHIP

Project: RIO GRANDE DE ARECIBO FLOOD CONTROL
Location: Arecibo, P.R.
Project No: 3006-03



Sample	Description	ASTM	AASHTO
TP-BA2-7 11.0 ft	**SILTY SAND with GRAVEL**	**SM**	**A-4**

Test Method	Nat. Moist.	% > No. 4 sieve	% < No. 200 sieve
ASTM D 698A	**8.0%**	**17.5**	**35.8**

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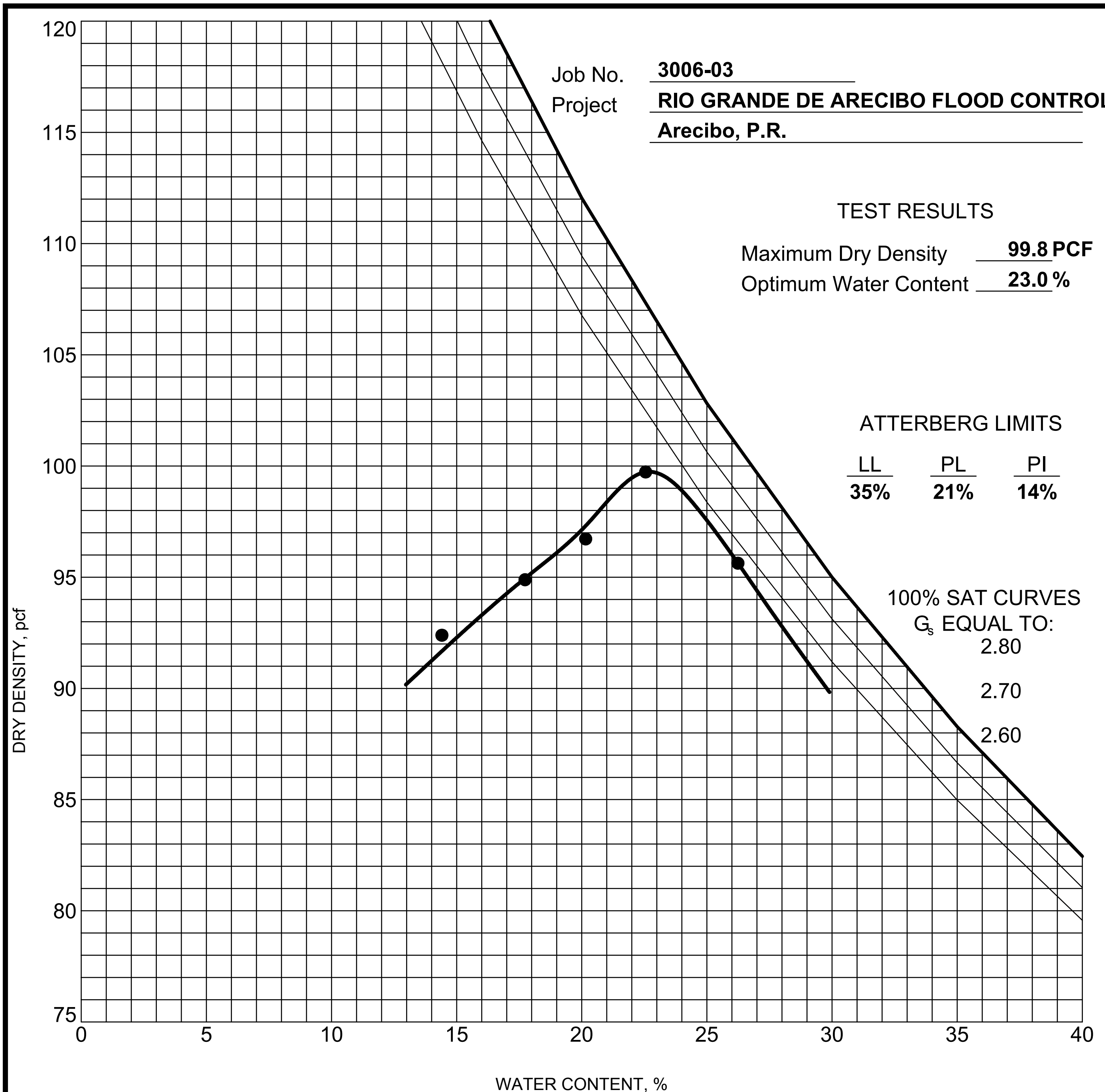
MOISTURE-DENSITY RELATIONSHIP

Project: RIO GRANDE DE ARECIBO FLOOD CONTROL
Location: Arecibo, P.R.
Project No: 3006-03

US COMPACTION DATE 3006-03.GPJ US LAB.GDT 8/28/03



Sample	Description	ASTM	AASHTO
TP-BA2-6 3.0 ft	**CLAYEY GRAVEL with SAND**	**GC**	**A-2-6**

Test Method	Nat. Moist.	% > No. 4 sieve	% < No. 200 sieve
ASTM D 698B	**9.0%**	**52.7**	**28.5**

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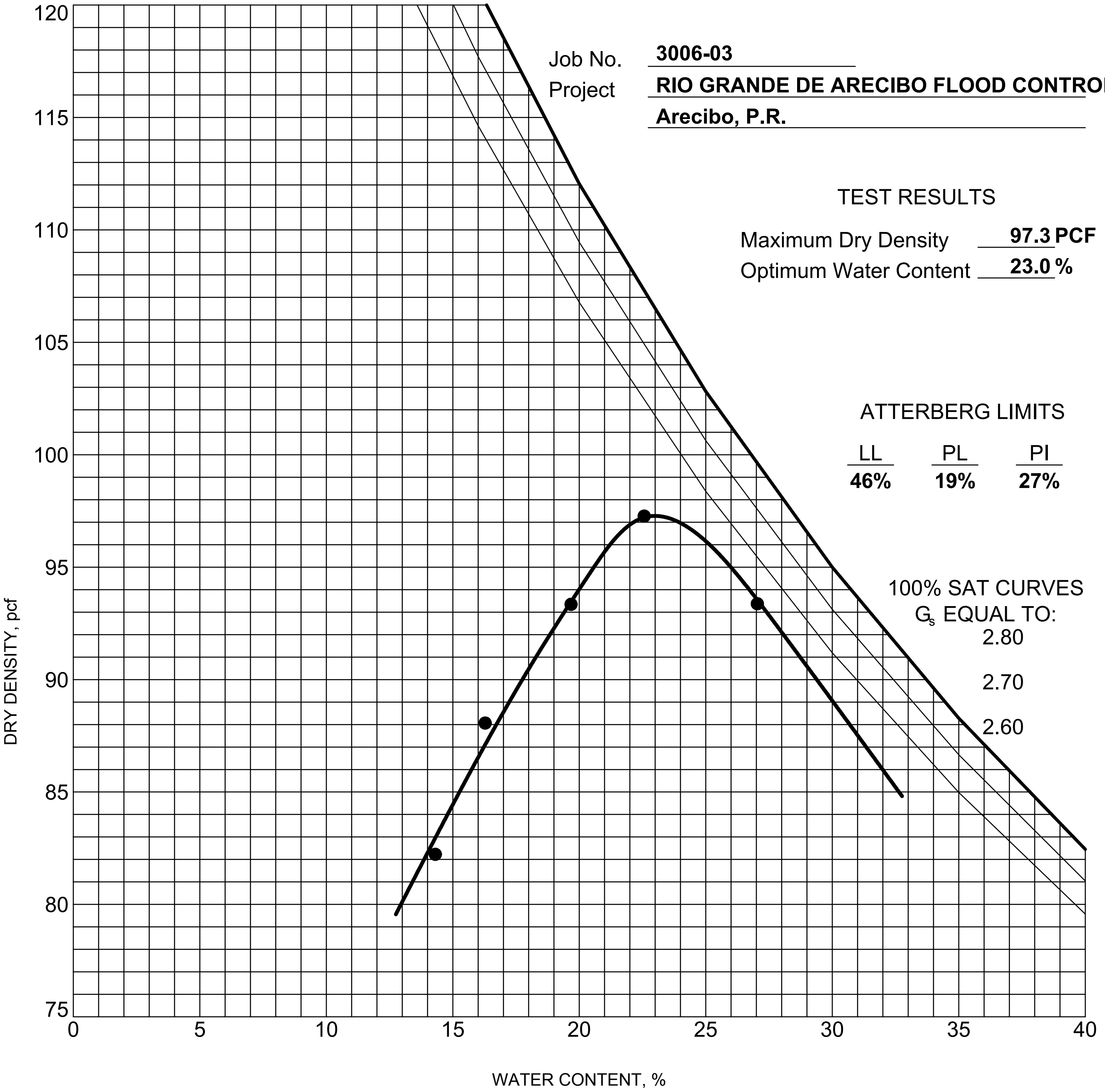
MOISTURE-DENSITY RELATIONSHIP

Project: RIO GRANDE DE ARECIBO FLOOD CONTROL
Location: Arecibo, P.R.
Project No: 3006-03



Job No. **3006-03**
Project **RIO GRANDE DE ARECIBO FLOOD CONTROL**
Arecibo, P.R.

TEST RESULTS

Maximum Dry Density **97.3** PCF
Optimum Water Content **23.0** %

ATTERBERG LIMITS

LL	PL	PI
46%	**19%**	**27%**

Sample	Description	ASTM	AASHTO
TP-BA2-5 4.5 ft	**CLAYEY GRAVEL with SAND**	**GC**	**A-2-7**

Test Method	Nat. Moist.	% > No. 4 sieve	% < No. 200 sieve
ASTM D 698B	**14.0%**	**48.4**	**31.5**

US COMPACTION DATE 3006-03.GPJ US LAB.GDT 8/28/03

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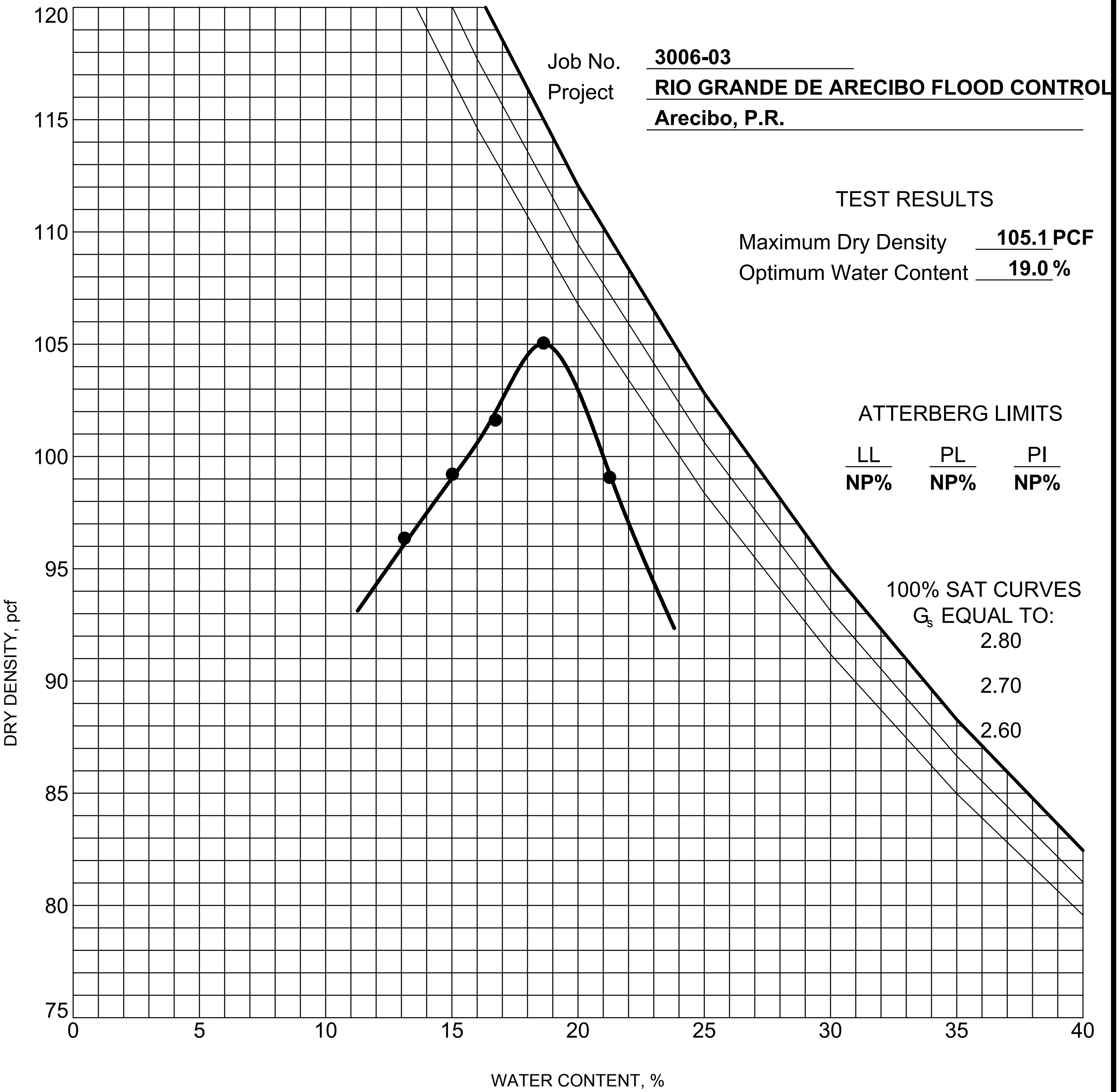
MOISTURE-DENSITY RELATIONSHIP

Project: RIO GRANDE DE ARECIBO FLOOD CONTROL
Location: Arecibo, P.R.
Project No: 3006-03



Sample	Description	ASTM	AASHTO
TP-BA2-4 10.17 ft	**SILTY GRAVEL with SAND**	**GM**	**A-1-b**

Test Method	Nat. Moist.	% > No. 4 sieve	% < No. 200 sieve
ASTM D 698B	**9.0%**	**54.7**	**17.0**

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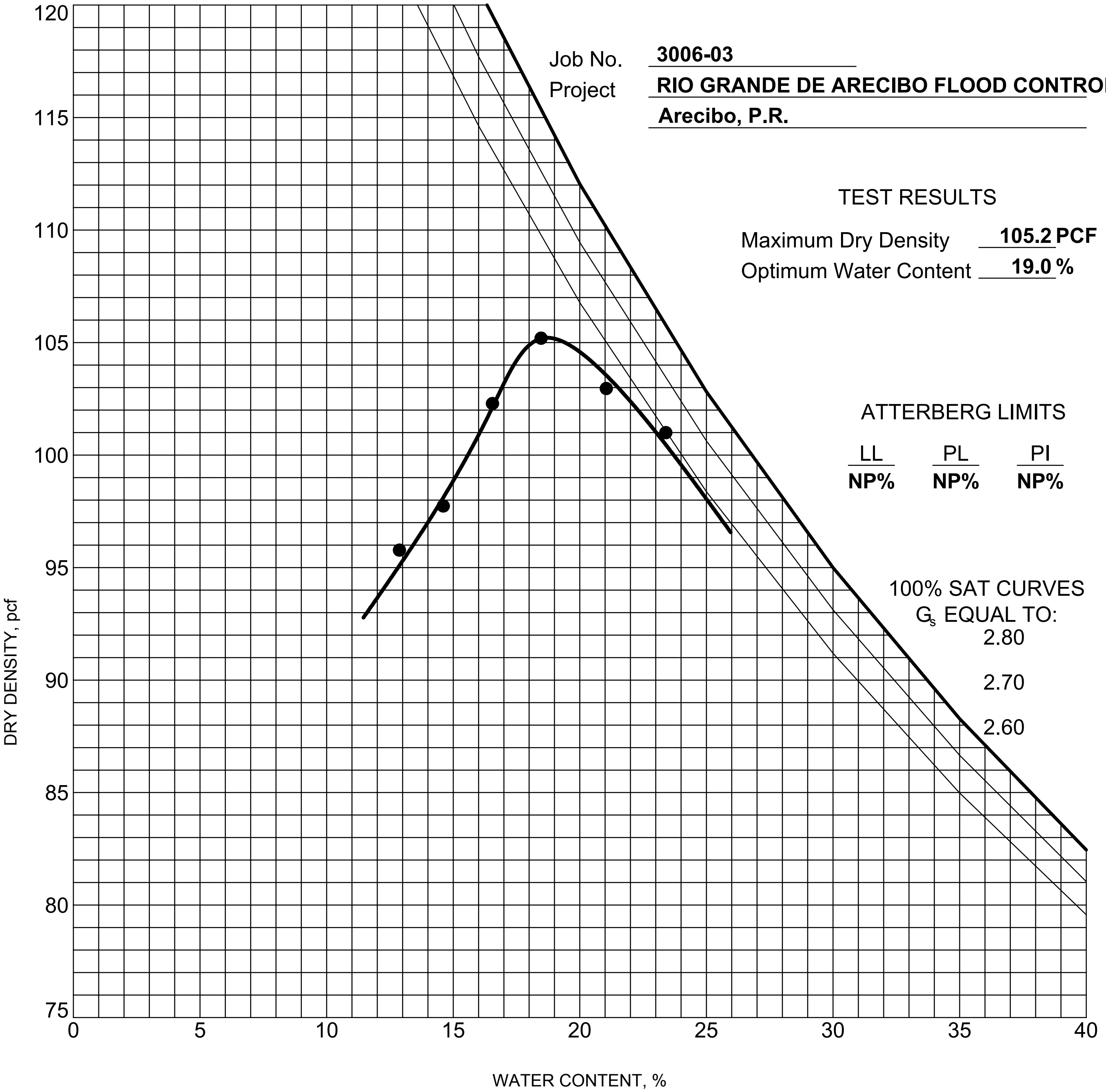
MOISTURE-DENSITY RELATIONSHIP

Project: RIO GRANDE DE ARECIBO FLOOD CONTROL
Location: Arecibo, P.R.
Project No: 3006-03

US COMPACTION DATE 3006-03.GPJ US LAB.GDT 8/28/03



Job No. 3006-03
Project RIO GRANDE DE ARECIBO FLOOD CONTROL
Arecibo, P.R.

TEST RESULTS

Maximum Dry Density **105.2** **PCF**
Optimum Water Content **19.0** **%**

ATTERBERG LIMITS

LL	PL	PI
NP%	**NP%**	**NP%**

Sample	Description	ASTM	AASHTO
TP-BA2-3 3.0 ft	**SILTY GRAVEL with SAND**	**GM**	**A-1-a**

Test Method	Nat. Moist.	% > No. 4 sieve	% < No. 200 sieve
ASTM D 698B	**12.0%**	**53.0**	**13.5**

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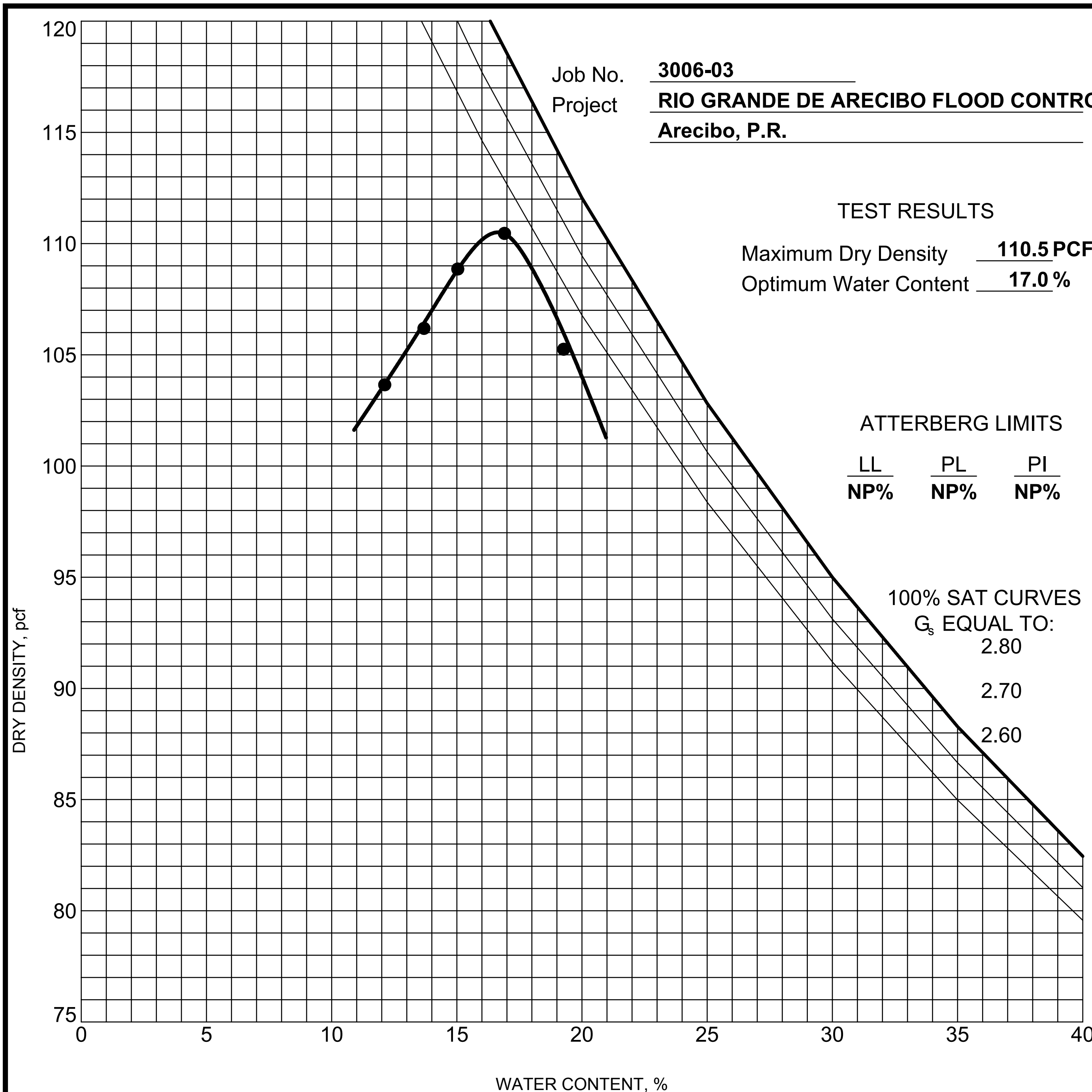
Location: Arecibo
Project No: 3006-03

Job No. 3006-03

Project RIO GRANDE DE ARECIBO FLOOD CONTROL

Arecibo, P.R.



TEST RESULTS

Maximum Dry Density 110.5 PCF

Optimum Water Content 17.0 %

ATTERBERG LIMITS

LL	PL	PI
NP%	**NP%**	**NP%**

Sample	Description	ASTM	AASHTO
TP-BA2-2 6.0 ft	**SILTY GRAVEL with SAND**	**GM**	**A-1-b**

Test Method	Nat. Moist.	% > No. 4 sieve	% < No. 200 sieve
ASTM D 698B	**3.0%**	**59.6**	**18.3**

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MOISTURE-DENSITY RELATIONSHIP

Project: RIO GRANDE DE ARECIBO FLOOD CONTROL

Location: Arecibo, P.R.

Project No: 3006-03

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Water Content

PROJECT : Arecibo River, PR "Diversion Channel" DATE : 8/8/2003
BORING No : CB-DC-12

Sample or Specimen No.			4	10	12	17	22	27
Sample or Specimen Depth (feet)			4.5-6.0	13.5-15.0	16.5-18	24-25.5	31.5-33	39-40.5
Tare No.			144	150	152	157	162	167
(gr)	Tare + wet soil	(1)	84.77	92.40	92.18	81.61	87.38	97.86
	Tare + dry soil	(2)	69.45	72.95	72.83	64.06	67.29	78.00
	Tare	(3)	21.57	21.84	22.10	22.03	22.20	21.79
	Water (1-2)	W_w	15.32	19.45	19.35	17.55	20.09	19.86
	Dry Soil (2-3)	W_s	47.88	51.11	50.73	42.03	45.09	56.21
Water Content		W	32	38	38	42	45	35

Sample or Specimen No.			32	36				
Sample or Specimen Depth (feet)			46.5-48	52.5-54				
Tare No.			172	176				
(gr)	Tare + wet soil	(1)	95.57	92.97				
	Tare + dry soil	(2)	71.21	68.13				
	Tare	(3)	21.65	22.42				
	Water (1-2)	W_w	24.36	24.84				
	Dry Soil (2-3)	W_s	49.56	45.71				
Water Content		W	49	54				

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

$$W_{\%} = \frac{\text{(tare + wet soil) - (tare + dry soil)}}{\text{(tare + dry soil) - (tare)}} \times 100 = \frac{W_w}{W_s} \times 100$$

Remarks: ______

Technician: ______ Computed by: ______ Checked by: ______

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Water Content

PROJECT : Arecibo River, PR "Diversion Channel" DATE : 8/10/2003

BORING No : CB-DC-13

Sample or Specimen No.			3	8	14	20	23	26
Sample or Specimen Depth (feet)			3-4.5	10.5-12	19.5-21	28.5-30	33-34.5	37.5-39
Tare No.			103	108	114	120	123	126
(gr)	Tare + wet soil	(1)	78.92	91.25	98.20	86.83	109.69	85.13
	Tare + dry soil	(2)	63.56	72.16	72.59	66.11	86.98	71.17
	Tare	(3)	20.78	20.65	20.56	20.98	21.46	21.24
	Water (1-2)	W_w	15.36	19.09	25.61	20.72	22.71	13.96
	Dry Soil (2-3)	W_s	42.78	51.51	52.03	45.13	65.52	49.93
Water Content		W	36	37	49	46	35	28

Sample or Specimen No.			28	31				
Sample or Specimen Depth (feet)			40.5-42	45-46.5				
Tare No.			128	131				
(gr)	Tare + wet soil	(1)	91.87	111.03				
	Tare + dry soil	(2)	73.23	99.50				
	Tare	(3)	21.95	21.86				
	Water (1-2)	W_w	18.64	11.53				
	Dry Soil (2-3)	W_s	51.28	77.64				
Water Content		W	36	15				

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

$$W_{\%} = \frac{\text{(tare + wet soil) - (tare + dry soil)}}{\text{(tare + dry soil) - (tare)}} \times 100 = \frac{W_w}{W_s} \times 100$$

Remarks: ______________________

Technician: ______________ Computed by: ______________ Checked by: ______________

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Water Content

PROJECT : Arecibo River, PR "Diversion Channel" DATE : 8/6/2003

BORING No : CB-DC-14

Sample or Specimen No.			3	7	9	11		
Sample or Specimen Depth (feet)			3-4.5	9-10.5	12-13.5	15-16.5		
Tare No.			103	107	109	111		
(gr)	Tare + wet soil	(1)	73.50	84.09	87.72	80.26		
	Tare + dry soil	(2)	62.87	73.25	69.36	62.21		
	Tare	(3)	20.78	20.69	20.38	20.62		
	Water (1-2)	W_w	10.63	10.84	18.36	18.05		
	Dry Soil (2-3)	W_s	42.09	52.56	48.98	41.59		
Water Content		W	25	21	37	43		

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

$$W_{\%} = \frac{\text{(tare + wet soil) - (tare + dry soil)}}{\text{(tare + dry soil) - (tare)}} \times 100 = \frac{W_w}{W_s} \times 100$$

Remarks:

Technician: Computed by: Checked by:

Water Content

PROJECT : Arecibo River, PR "Diversion Channel" DATE : 8/8/2003
BORING No : CB-DC-15

Sample or Specimen No.			3	7	11			
Sample or Specimen Depth (feet)			3-4.5	9-10.5	15-16.5			
Tare No.			117	121	125			
(gr)	Tare + wet soil	(1)	60.96	89.40	88.27			
	Tare + dry soil	(2)	54.69	73.60	80.15			
	Tare	(3)	21.16	21.34	21.38			
	Water (1-2)	W_w	6.27	15.80	8.12			
	Dry Soil (2-3)	W_s	33.53	52.26	58.77			
Water Content		W	19	30	14			

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

$$W_{\%} = \frac{\text{(tare + wet soil) - (tare + dry soil)}}{\text{(tare + dry soil) - (tare)}} \times 100 = \frac{W_w}{W_s} \times 100$$

Remarks: __________

Technician: __________ Computed by: __________ Checked by: __________

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Water Content

PROJECT : Arecibo River, PR "Diversion Channel" DATE : 8/8/2003

BORING No : CB-DC-16

Sample or Specimen No.			2	5	8	11	13	
Sample or Specimen Depth (feet)			1.5-3	6-7.5	10.5-12	15-16.5	18-19.5	
Tare No.			130	133	136	139	141	
(gr)	Tare + wet soil	(1)	56.87	70.22	76.86	95.48	78.17	
	Tare + dry soil	(2)	47.62	54.93	69.55	74.29	58.80	
	Tare	(3)	21.64	21.37	21.99	21.83	21.36	
	Water (1-2)	W_w	9.25	15.29	7.31	21.19	19.37	
	Dry Soil (2-3)	W_s	25.98	33.56	47.56	52.46	37.44	
Water Content		W	36	46	15	40	52	

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

$$W_{\%} = \frac{\text{(tare + wet soil) - (tare + dry soil)}}{\text{(tare + dry soil) - (tare)}} \times 100 = \frac{W_w}{W_s} \times 100$$

Remarks: ____________________

Technician: __________ Computed by: __________ Checked by: __________

Water Content

PROJECT : Arecibo River, PR "Diversion Channel" DATE : 8/12/2003
BORING No : CB-DC-17

Sample or Specimen No.			4	8	11	14		
Sample or Specimen Depth (feet)			4.5-6	10.5-12	15-16.5	19.5-21		
Tare No.			144	148	151	154		
(gr)	Tare + wet soil	(1)	88.96	115.88	113.45	79.00		
	Tare + dry soil	(2)	86.41	107.07	105.11	63.31		
	Tare	(3)	21.56	21.61	22.04	21.54		
	Water (1-2)	W_w	2.55	8.81	8.34	15.69		
	Dry Soil (2-3)	W_s	64.85	85.46	83.07	41.77		
Water Content		W	4	10	10	38		

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

$$W_{\%} = \frac{\text{(tare + wet soil) - (tare + dry soil)}}{\text{(tare + dry soil) - (tare)}} \times 100 = \frac{W_w}{W_s} \times 100$$

Remarks:

Technician: Computed by: Checked by:

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Water Content

PROJECT : Arecibo River, PR "Arecibo Levee" DATE : 8/11/2003

BORING No : CB-RGA-14A

Sample or Specimen No.			4	8	14	20	25	29
Sample or Specimen Depth (feet)			4.5-6	10.5-12	19.5-21	28.6-30	36-37.5	42-43.5
Tare No.			114	118	124	130	135	139
(gr)	Tare + wet soil	(1)	77.72	98.21	120.56	110.32	97.92	103.09
	Tare + dry soil	(2)	61.72	88.52	109.01	95.32	88.10	89.87
	Tare	(3)	20.57	20.93	21.86	21.63	21.90	21.84
	Water (1-2)	W_w	16.00	9.69	11.55	15.00	9.82	13.22
	Dry Soil (2-3)	W_s	41.15	67.59	87.15	73.69	66.20	68.03
Water Content		W	39	14	13	20	15	19

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

$$W_{\%} = \frac{\text{(tare + wet soil) - (tare + dry soil)}}{\text{(tare + dry soil) - (tare)}} \times 100 = \frac{W_w}{W_s} \times 100$$

Remarks: ______

Technician: ______ Computed by: ______ Checked by: ______

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Water Content

PROJECT : Arecibo River, PR "Diversion Channel" DATE : 8/18/2003
BORING No : TP-DC-1

Sample or Specimen No.			1					
Sample or Specimen Depth (feet)			7					
Tare No.			006265A					
(gr)	Tare + wet soil	(1)	341.62					
	Tare + dry soil	(2)	272.56					
	Tare	(3)	50.17					
	Water (1-2)	W_w	69.06					
	Dry Soil (2-3)	W_s	222.39					
Water Content		W	31					

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

$$W_{\%} = \frac{\text{(tare + wet soil) - (tare + dry soil)}}{\text{(tare + dry soil) - (tare)}} \times 100 = \frac{W_w}{W_s} \times 100$$

Remarks: ______

Technician: ______ Computed by: ______ Checked by: ______

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Water Content

PROJECT : Arecibo River, PR "Diversion Channel" DATE : 8/18/2003

BORING No : TP-DC-2

Sample or Specimen No.			1					
Sample or Specimen Depth (feet)			6.5					
Tare No.			007365A					
(gr)	Tare + wet soil	(1)	319.56					
	Tare + dry soil	(2)	261.52					
	Tare	(3)	50.24					
	Water (1-2)	W_w	58.04					
	Dry Soil (2-3)	W_s	211.28					
Water Content		W	27					

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

$$W_{\%} = \frac{\text{(tare + wet soil) - (tare + dry soil)}}{\text{(tare + dry soil) - (tare)}} \times 100 = \frac{W_w}{W_s} \times 100$$

Remarks: ______

Technician: ______ Computed by: ______ Checked by: ______

GEOCONSULT

Geotechnical Engineers

Water Content

PROJECT : Arecibo River, PR "Diversion Channel" DATE : 8/18/2003

BORING No : TP-DC-3

Sample or Specimen No.			1	2				
Sample or Specimen Depth (feet)			6	7.75				
Tare No.			007165A	007265A				
(gr)	Tare + wet soil	(1)	347.44	492.33				
	Tare + dry soil	(2)	291.05	479.06				
	Tare	(3)	49.93	49.66				
	Water (1-2)	W_w	56.39	13.27				
	Dry Soil (2-3)	W_s	241.12	429.40				
Water Content		W	23	3				

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

$$W_{\%} = \frac{\text{(tare + wet soil) - (tare + dry soil)}}{\text{(tare + dry soil) - (tare)}} \times 100 = \frac{W_w}{W_s} \times 100$$

Remarks:

Technician: Computed by: Checked by:

Water Content

PROJECT : Arecibo River, PR "Diversion Channel" DATE : 8/18/2003
BORING No : TP-DC-4

Sample or Specimen No.			1					
Sample or Specimen Depth (feet)			6.5					
Tare No.			018065A					
(gr)	Tare + wet soil	(1)	341.00					
	Tare + dry soil	(2)	277.96					
	Tare	(3)	49.87					
	Water (1-2)	W_w	63.04					
	Dry Soil (2-3)	W_s	228.09					
Water Content		W	28					

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

$$W_{\%} = \frac{\text{(tare + wet soil) - (tare + dry soil)}}{\text{(tare + dry soil) - (tare)}} \times 100 = \frac{W_w}{W_s} \times 100$$

Remarks:

Technician: Computed by: Checked by:

Water Content

PROJECT : Arecibo River, PR "Diversion Channel" DATE : 8/18/2003
BORING No : TP-DC-5

Sample or Specimen No.			1					
Sample or Specimen Depth (feet)			4					
Tare No.			009065A					
(gr)	Tare + wet soil	(1)	324.99					
	Tare + dry soil	(2)	258.79					
	Tare	(3)	49.18					
	Water (1-2)	W_w	66.20					
	Dry Soil (2-3)	W_s	209.61					
Water Content		W	32					

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

$$W_{\%} = \frac{\text{(tare + wet soil) - (tare + dry soil)}}{\text{(tare + dry soil) - (tare)}} \times 100 = \frac{W_w}{W_s} \times 100$$

Remarks:

Technician: Computed by: Checked by:

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Geotechnical Engineers

Water Content

PROJECT : Arecibo River, PR "Alternate Borrow Area (South of PR-22)" DATE : 8/18/2003

BORING No : TP-BA2-1

Sample or Specimen No.			1					
Sample or Specimen Depth (feet)			8.67					
Tare No.			008265A					
(gr)	Tare + wet soil	(1)	374.13					
	Tare + dry soil	(2)	356.62					
	Tare	(3)	49.71					
	Water (1-2)	W_w	17.51					
	Dry Soil (2-3)	W_s	306.91					
Water Content		W	6					

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

$$W_{\%} = \frac{\text{(tare + wet soil) - (tare + dry soil)}}{\text{(tare + dry soil) - (tare)}} \times 100 = \frac{W_w}{W_s} \times 100$$

Remarks:

Technician: Computed by: Checked by:

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Geotechnical Engineers

Water Content

PROJECT : Arecibo River, PR "Alternate Borrow Area (South of PR-22)" DATE : 8/18/2003
BORING No : TP-BA2-2

Sample or Specimen No.			1					
Sample or Specimen Depth (feet)			6					
Tare No.			009665A					
(gr)	Tare + wet soil	(1)	375.50					
	Tare + dry soil	(2)	367.22					
	Tare	(3)	49.24					
	Water (1-2)	W_w	8.28					
	Dry Soil (2-3)	W_s	317.98					
Water Content		W	3					

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

$$W_{\%} = \frac{\text{(tare + wet soil) - (tare + dry soil)}}{\text{(tare + dry soil) - (tare)}} \times 100 = \frac{W_w}{W_s} \times 100$$

Remarks:

Technician: Computed by: Checked by:

GEOCONSULT

Geotechnical Engineers

Water Content

PROJECT : Arecibo River, PR "Alternate Borrow Area (South of PR-22)" DATE : 8/18/2003

BORING No : TP-BA2-3

Sample or Specimen No.			1					
Sample or Specimen Depth (feet)			3					
Tare No.			008465A					
(gr)	Tare + wet soil	(1)	362.61					
	Tare + dry soil	(2)	329.70					
	Tare	(3)	49.51					
	Water (1-2)	W_w	32.91					
	Dry Soil (2-3)	W_s	280.19					
Water Content		W	12					

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

$$W_{\%} = \frac{\text{(tare + wet soil) - (tare + dry soil)}}{\text{(tare + dry soil) - (tare)}} \times 100 = \frac{W_w}{W_s} \times 100$$

Remarks: ____________________

Technician: ____________ Computed by: ____________ Checked by: ____________

GEOCONSULT

Geotechnical Engineers

Water Content

PROJECT : Arecibo River, PR "Alternate Borrow Area (South of PR-22)" DATE : 8/18/2003

BORING No : TP-BA2-4

Sample or Specimen No.			1					
Sample or Specimen Depth (feet)			10.17					
Tare No.			00765A					
(gr)	Tare + wet soil	(1)	395.91					
	Tare + dry soil	(2)	366.24					
	Tare	(3)	50.37					
	Water (1-2)	W_w	29.67					
	Dry Soil (2-3)	W_s	315.87					
Water Content		W	9					

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

$$W_{\%} = \frac{(\text{tare + wet soil}) - (\text{tare + dry soil})}{(\text{tare + dry soil}) - (\text{tare})} \times 100 = \frac{W_w}{W_s} \times 100$$

Remarks:

Technician: Computed by: Checked by:

GEOCONSULT

Geotechnical Engineers

Water Content

PROJECT : Arecibo River, PR "Alternate Borrow Area (South of PR-22)" DATE : 8/18/2003

BORING No : TP-BA2-5

Sample or Specimen No.			1					
Sample or Specimen Depth (feet)			4.5					
Tare No.			0035ATL					
(gr)	Tare + wet soil	(1)	268.85					
	Tare + dry soil	(2)	242.31					
	Tare	(3)	49.83					
	Water (1-2)	W_w	26.54					
	Dry Soil (2-3)	W_s	192.48					
Water Content		W	14					

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

$$W_{\%} = \frac{\text{(tare + wet soil) - (tare + dry soil)}}{\text{(tare + dry soil) - (tare)}} \times 100 = \frac{W_w}{W_s} \times 100$$

Remarks:

Technician: Computed by: Checked by:

GEOCONSULT

Geotechnical Engineers

Water Content

PROJECT : Arecibo River, PR "Alternate Borrow Area (South of PR-22)" DATE : 8/18/2003

BORING No : TP-BA2-6

Sample or Specimen No.			1					
Sample or Specimen Depth (feet)			3					
Tare No.			009365A					
(gr)	Tare + wet soil	(1)	402.78					
	Tare + dry soil	(2)	374.43					
	Tare	(3)	49.76					
	Water (1-2)	W_w	28.35					
	Dry Soil (2-3)	W_s	324.67					
Water Content		W	9					

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

$$W_{\%} = \frac{\text{(tare + wet soil) - (tare + dry soil)}}{\text{(tare + dry soil) - (tare)}} \times 100 = \frac{W_w}{W_s} \times 100$$

Remarks: ______________________

Technician: ____________ Computed by: ____________ Checked by: ____________

Water Content

PROJECT : Arecibo River, PR "Alternate Borrow Area (South of PR-22)" DATE : 8/18/2003
BORING No : TP-BA2-7

Sample or Specimen No.			1					
Sample or Specimen Depth (feet)			10					
Tare No.			007865A					
(gr)	Tare + wet soil	(1)	366.57					
	Tare + dry soil	(2)	344.06					
	Tare	(3)	50.12					
	Water (1-2)	W_w	22.51					
	Dry Soil (2-3)	W_s	293.94					
Water Content		W	8					

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

Sample or Specimen No.								
Sample or Specimen Depth (feet)								
Tare No.								
(gr)	Tare + wet soil	(1)						
	Tare + dry soil	(2)						
	Tare	(3)						
	Water (1-2)	W_w						
	Dry Soil (2-3)	W_s						
Water Content		W						

$$W_{\%} = \frac{\text{(tare + wet soil) - (tare + dry soil)}}{\text{(tare + dry soil) - (tare)}} \times 100 = \frac{W_w}{W_s} \times 100$$

Remarks: ____________________

Technician: ____________ Computed by: ____________ Checked by: ____________

APPENDIX D
IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL REPORT

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. *No one except you* should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one—not even you—*should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, *do not rely on a geotechnical engineering report* that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions *only* at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an *opinion* about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject To Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce such risks, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations", many of these provisions indicate where geotechnical engineers responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Rely on Your Geotechnical Engineer for Additional Assistance

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Arecibo River, P.R.

Geotechnical Investigation

Culverts under PR-10

Arecibo, Puerto Rico

U.S. Army Corps of Engineers

September 02, 2004

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1. INTRODUCTION

This conceptual investigation report is prepared for Delivery Order No 7 under Contract N° DACW17-01-D-0032. The report presents the results of a geotechnical investigation conducted along the proposed diversion channel for the referenced project at the location where passes underneath PR-10. The location of the site is shown in **Figure 1**. This geotechnical investigation will complement information previously collected under Task Order No 6. The project is intended to improve flood control of the Río Grande de Arecibo in areas surrounding the town of Arecibo.

The additional information is required due to a design change that involves the construction of a channel underpass through PR-10 by installation of six, 6-foot diameter concrete pipes.

The exploration included one boring and three Cone Penetration Tests (CPT). Continuous sampling was used in the boring. The core borings and cone penetration tests are located as follows:

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BORING	DEPTH (feet)	X (feet)	Y (feet)	ELEVATION (feet)
CB-DC04-12A	120.0	401,558	223,750	16.6
CP-DC04-1	91.0	401,452	223,702	16.6
CP-DC04-2	75.5	401,741	223,760	18.5
CP-DC04-3	77.6	401,619	223,786	32.0

Table 1: Boring and CPTs locations.

Note: Coordinates are in NAD 27 and elevations in NGVD 29. Monuments used for survey are ARH-031 and ARH-068.

The locations of the tests were established so that CB-DC04-12A and CP-DC04-1 are next to previous boring CB-DC-12 (Task Order 6). The upper 60 feet of boring CB-DC04-12A were auger advanced without sample recovery. Boring CP-DC04-2 is located next to previous boring CB-DC-13. Borehole CP-DC04-3 is located at the center of PR-10, almost aligned between CP-DC04-1 and CP-DC04-2.

2. GEOLOGICAL SETTING

The project lies within the Arecibo Quadrangle (Geologic Map of the Arecibo Quadrangle, USGS Map I-551, R.P.Briggs-1968). The geology of the proposed Rio Grande de Arecibo Flood Control is characterized by Quaternary floodplain alluvium deposits (Qa) consisting of gradationally stratified layers of brown to dark yellowish brown clayey to silty gravel and sands of moderate to well sorting. Most of these layers derive from the physical and chemical disintegration of Tertiary-Cretaceous intrusive igneous bodies (Tki, Dioritic intrusive rocks; Tku, rocks of the Utuado pluton) and other late Cretaceous volcanic formations (Kt, Tetuán Formation; Ka, Alonso Formation) exposed along the Rio Grande de Arecibo in the municipality of Utuado (Geologic Map of the Utuado Quadrangle, USGS Map I-480, A.E.Nelson-1967). Also included are Tertiary limestone formations (Ta, Aguada Limestone; Tay, Aymamón Limestone; Tc/Tcm, Cibao Formation) extending from the middle south of Arecibo to the north area of Utuado. Some of these deposits are overlaid by swamp deposits (Qs), consisting of gray to dark gray soft clay and sandy clays with organic content of partially decomposed plant debris.

3. GEOTECHNICAL CHARACTERIZATION AND CONCEPTUAL RECOMMENDATIONS

The boring was performed by rotary drilling with hollow stem augers in general accordance with ASTM D1452-84. Standard Penetration Tests were performed in general accordance with ASTM D1586-84 on all samples. Retrieved samples were classified and described in the field by the visual-manual procedure in general accordance with ASTM D2488, then stored in plastic jars and transported in wood core boxes to the laboratory for testing and water content determination (ASTM D2216-92). Standard penetration tests (SPT) N-values, in blows per foot, are shown on the drilling log.

A detailed description of the soils and materials encountered in the boring is presented in the boring log included in **Appendix A**. This log shows the subsoil conditions found, on the dates and locations indicated in this report.

Cone Penetration Tests (CPT) were performed in general accordance with ASTM D3441-98. Tests were advanced at a penetration rate in the order of 3 feet per minute. The CPTs were performed with water pressure measurements. A detailed tabulation of the CPT test results is presented with the CPT logs included in **Appendix B**.

The soil profile had previously been characterized using two 60-foot core boreholes identified as CB-DC-12 and CB-DC-13, drilled at the west and east sides of PR-10, respectively. Borehole CB-DC-13 indicated the presence of softer materials to approximately 42 feet (elevation -23.3 feet msl) and more competent materials to 60 feet. However, at borehole CB-DC-12, the softer material was found over the entire exploration depth of 60 feet. Borehole CB-DC04-12A, performed under this task order, revealed that the softer material extends to approximately 67.5 feet (elevation -50.9 feet msl). Borehole CB-DC04-12A was advanced with an auger to a depth of 60 feet. Thereafter, the subsoil is characterized by the presence of interbedded layers of medium to stiff-consistency organic clay, fat clay and peat to approximately 70.2 feet. Underlying the clays a layer of poorly graded sand is found to 78.4 feet. The sand is in a medium-density condition from 70.2 to 75.0 feet and then is loose to 78.4 feet. Underneath the sand, medium-consistency organic clay is found to 81.7 feet. Stiff-consistency fat clay is found underneath the organic clay to 96 feet. A lense of peat is found between 86.2 and 87.3 feet. The last layer, for the purpose of this investigation, is characterized as fat and lean clays exhibiting very stiff to hard consistency (this very stiff organic layer at great depth is frequently found in northen Puerto Rico). Two lenses of gravel and sand were found from 102.0 to 103.5 feet and from 116.6 to 118.4 feet.

The information obtained from boring CB-DC-12A will allow for a more refined design of the retaining structures for the temporary support of the shafts required to serve as a reaction to the jacking force.

The cone penetration test performed approximately at the center of PR-10 provided information on the strength characteristics of the soil underneath the

PR-10 embankment. The results from the 3 cone penetration tests (two outside and one underneath the embankment footprint) indicate that the additional load from the embankment has not significantly increased the soil strength parameters, since the tip and friction resistances measured with the CPTs are quite similar within the compressible layers.

We do not know the exact date when the embankment was built, but it is our estimate that the embankment has been in place for more than 15 years. In terms of settlements induced by consolidation under the embankment loads, it is not expected that additional (or considerable) settlements will occur under the current loading condition.

The CPTs showed the presence of relatively frequent lenses of more permeable materials than the predominant clays. This condition speeds consolidation but may also affect the performance of the dewatering system and should be considered in the design.

Considering that the more competent material is shallower at the east side of PR-10, and that pipe jacking will be done advancing from one side, it is advisable that the jacks be placed in the east shaft.

Additional conceptual recommendations are provided in our previous report submitted for the Río Grande de Arecibo Flood Control Project, dated October 10, 2003.

4. FINAL REMARKS

Be aware that all of the information gathered from the boreholes is discrete; therefore, interpolation is necessary to cover the area of interest. These data interpolations are based on the engineer's judgment, supported by the soil soundings, laboratory tests and regional geology trends. However, due to possible changes on local site conditions, certain differences between the assumed soil models and the real site conditions might be expected. See **Appendix C** for important information about this geotechnical report.

This document has been prepared specifically for the previously referred client and project. It should not be used for design at any other location or any structure other than those mentioned in this report without review by a qualified geotechnical engineer.

September 02, 2004
San Juan, Puerto Rico
Project N° 3007-03

Javier Rodríguez
Geotechnical Engineer

Alan R. Crumley, P.E.
Managing Partner

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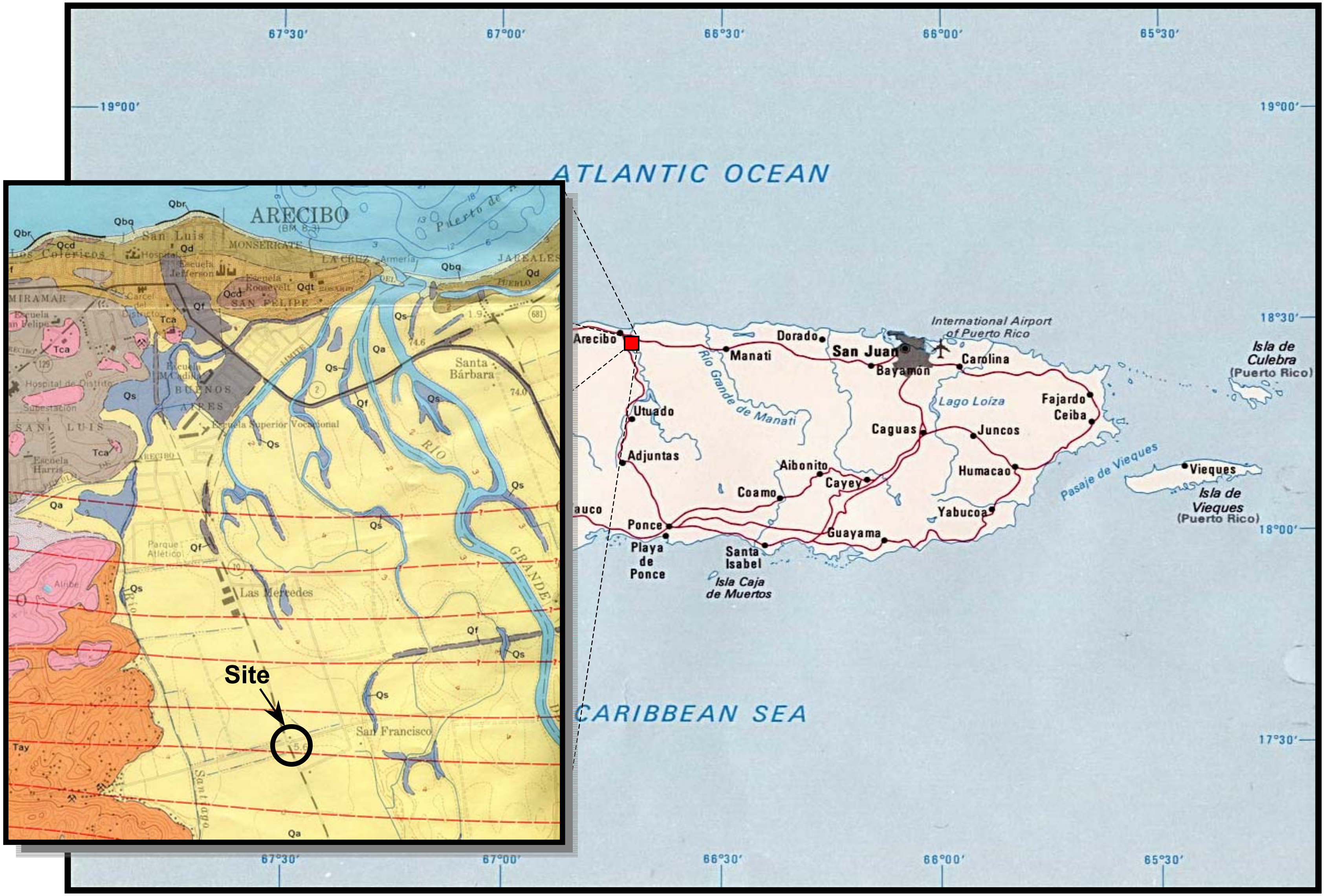

Figure 1. Site Location Plan and Generalized Geology. Rio Grande de Arecibo PR, Culverts under PR-10 – Arecibo, P.R. (Contract #DACW17-01-D-0032)
From: Reginald P. Briggs (1968), "Geologic Map of the Arecibo Quadrangle, Puerto Rico". Map No. I-551, Department of the Interior, United States Geological Survey.

Appendix A
Boring Logs

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 8 SHEETS

1. PROJECT: Arecibo River PR, PR-10 Culverts	9. SIZE AND TYPE OF BIT: See Remarks
	10. COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.) — HORIZONTAL: NAD27 — VERTICAL: NGVD29
2. BORING DESIGNATION: CB-DC04-12A — LOCATION COORDINATES: X = 401,558 Y = 223,750	11. MANUFACTURER'S DESIGNATION OF DRILL: CME-55 (Truck Mounted) — ☒ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAJ — CONTRACTOR FILE NO.: 3007-04	12. TOTAL SAMPLES — DISTURBED: 40 — UNDISTURBED (UD): 0
4. NAME OF DRILLER: Jaime Nieves	13. TOTAL NUMBER CORE BOXES: 2
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED — DEG. FROM VERTICAL: — BEARING:	14. ELEVATION GROUND WATER: -4.5 Ft. measured after 24 hrs.
	15. DATE BORING — STARTED: 08-20-04 — COMPLETED: 08-25-04
6. THICKNESS OF OVERBURDEN: N/A	16. ELEVATION TOP OF BORING: 16.6 Ft.
7. DEPTH DRILLED INTO ROCK: N/A	17. TOTAL RECOVERY FOR BORING: 97 %
8. TOTAL DEPTH OF BORING: 120.0 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Jorge I. Wichy, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
16.6	0.0						16.6		
							Advanced Boring w/ hollow stem auger		

0 5 10 15

(Continued)

Boring Designation CB-DC04-12A

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District			SHEET 2 OF 8 SHEETS
PROJECT Arecibo River PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29	
LOCATION COORDINATES X = 401,558 Y = 223,750	ELEVATION TOP OF BORING 16.6 Ft.			

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
							Advanced Boring w/ hollow stem auger		

15
20
25
30
35

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Boring Designation CB-DC04-12A

DRILLING LOG (Cont. Sheet)	**INSTALLATION** Jacksonville District		**SHEET** 3 **OF** 8 **SHEETS**
PROJECT Arecibo River PR	**COORDINATE SYSTEM/DATUM** State Plane, PR/VI (U.S. Ft.)	**HORIZONTAL** NAD27	**VERTICAL** NGVD29
LOCATION COORDINATES X = 401,558 Y = 223,750	**ELEVATION TOP OF BORING** 16.6 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
							Advanced Boring w/ hollow stem auger		

35

40

45

50

55

SAJ FORM 1836-A
JUN 02

Boring Designation CB-DC04-12A

DRILLING LOG (Cont. Sheet)	INSTALLATION: Jacksonville District		SHEET 4 OF 8 SHEETS
PROJECT: Arecibo River PR	COORDINATE SYSTEM/DATUM: State Plane, PR/VI (U.S. Ft.)	HORIZONTAL: NAD27	VERTICAL: NGVD29
LOCATION COORDINATES: X = 401,558 Y = 223,750	ELEVATION TOP OF BORING: 16.6 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
							Advanced Boring w/ hollow stem auger		
-43.4	60.0						-43.4		
			CLAY, organic-H, medium plasticity, soft, trace subrounded fine-grained sand-sized alluvial deposit, no reaction with HCl, moist, homogeneous, organic odor, 10YR 4/1 dark gray (OH)	89	1		SPT Sampler -44.9	3 / 4 / 5	9
				95	2		SPT Sampler -46.4	4 / 4 / 5	9
			From El. -46.7 to -48.7 Ft., few subrounded coarse-grained sand-sized alluvial deposit, few plant debris	100	3		SPT Sampler -47.9	3 / 4 / 4	8
-48.7	65.3			100	4		SPT Sampler -49.4	4 / 3 / 4	7
			CLAY, fat, high plasticity, firm, no reaction with HCl, moist, homogeneous, no odor, 10YR 4/1 dark gray (CH)	100	5		SPT Sampler -50.9	3 / 3 / 4	7
-50.9	67.5								
			PEAT, firm, trace subangular fine-grained sand-sized alluvial deposit, no reaction with HCl, moist, homogeneous, organic odor, 10YR 2/1 black (PT)	100	6		SPT Sampler -52.4	5 / 6 / 7	13
-52.2	68.8								
			CLAY, fat, high plasticity, firm, no reaction with HCl, moist, homogeneous, no odor, 10YR 4/1 dark gray (CH)	100	7		SPT Sampler -53.9	6 / 7 / 9	16
-53.6	70.2								
			SAND, poorly-graded, mostly subangular fine to medium-grained sand-sized alluvial deposit, no reaction with HCl, moist, weak cementation, homogeneous, 10YR 4/1 dark gray (SP)	100	8		SPT Sampler -55.4	5 / 7 / 8	15
			From El. -55.9 to -58.7 Ft., few silt	100	9		SPT Sampler -56.9	7 / 9 / 8	17
				100	10		SPT Sampler -58.4	4 / 8 / 10	18

Depth scale: 55, 60, 65, 70, 75

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Boring Designation CB-DC04-12A

DRILLING LOG (Cont. Sheet)	**INSTALLATION** Jacksonville District		**SHEET** 5 **OF** 8 **SHEETS**
PROJECT Arecibo River PR	**COORDINATE SYSTEM/DATUM** State Plane, PR/VI (U.S. Ft.)	**HORIZONTAL** NAD27	**VERTICAL** NGVD29
LOCATION COORDINATES X = 401,558 Y = 223,750	**ELEVATION TOP OF BORING** 16.6 Ft.		

ELEV.	DEPTH	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
		From El. -58.7 to -61.8 Ft., mostly subangular fine-grained sand-sized alluvial deposit	95	11		SPT Sampler -59.9	1 2 2	4
			100	12		SPT Sampler -61.4	1 1 1	2
-61.8	78.4	CLAY, organic-H, medium plasticity, firm, no reaction with HCl, moist, homogeneous, organic odor, 10YR 5/2 grayish brown (OH)	100	13		SPT Sampler -62.9	3 2 4	6
		From El. -63.6 to -65.1 Ft., 10YR 4/1 dark gray	100	14		SPT Sampler -64.4	2 2 4	6
-65.1	81.7	CLAY, fat, firm, no reaction with HCl, moist, homogeneous, no odor, 10YR 4/1 dark gray (CH)	100	15		SPT Sampler -65.9	2 3 3	6
		From El. -67.0 to -69.6 Ft., few subangular fine-grained sand-sized alluvial deposit, wet	100	16		SPT Sampler -67.4	6 7 9	16
			100	17		SPT Sampler -68.9	4 5 6	11
-69.6	86.2	PEAT, hard, no reaction with HCl, moist, homogeneous, organic odor, 10YR 2/1 black (PT)	100	18		SPT Sampler -70.4	13 15 15	30
-70.7	87.3	CLAY, fat, high plasticity, firm, trace plant debris, no reaction with HCl, moist, homogeneous, no odor, 10YR 6/1 gray (CH)	100	19		SPT Sampler -71.9	4 4 4	8
			100	20		SPT Sampler -73.4	3 3 4	7
			100	21		SPT Sampler -74.9	3 4 6	10
			100	22		SPT Sampler -76.4	3 4 5	9
		From El. -76.1 to -82.0 Ft., little subangular to subrounded medium-grained sand-sized alluvial deposit, trace subrounded to rounded fine gravel-sized alluvial deposit, 10YR 5/2 grayish brown	100	23		SPT Sampler -77.9	6 6 7	13
			100	24		SPT Sampler	6	

Boring Designation CB-DC04-12A

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District		SHEET 6 OF 8 SHEETS
PROJECT Arecibo River PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29
LOCATION COORDINATES X = 401,558 Y = 223,750	ELEVATION TOP OF BORING 16.6 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
				100	24		SPT Sampler -79.4	6 / 8	14
				100	25		SPT Sampler -80.9	7 / 8 / 9	17
			From El. -82.0 to -85.4 Ft., some subangular to subrounded medium to coarse-grained sand-sized alluvial deposit, few subrounded coarse gravel-sized alluvial deposit, 5Y 3/2 dark olive gray	100	26		SPT Sampler -82.4	13 / 15 / 16	31
				100	27		SPT Sampler -83.9	14 / 12 / 14	26
-85.4	102.0			100	28		SPT Sampler -85.4	14 / 14 / 14	28
			GRAVEL, clayey, mostly angular to subangular fine to coarse gravel-sized alluvial deposit, no reaction with HCl, wet, moderate cementation, homogeneous, 2.5Y 4/4 olive brown (GC)	100	29		SPT Sampler -85.7	50/0.3'	
-86.9	103.5			0			Advanced Boring w/ hollow stem auger -86.9		
			CLAY, lean, medium plasticity, firm, some subrounded fine to coarse gravel-sized alluvial deposit, trace subrounded medium-grained sand-sized alluvial deposit, no reaction with HCl, moist, homogeneous, 5Y 4/2 olive gray (CL)	89	30		SPT Sampler -88.4	25 / 22 / 19	41
-90.2	106.8			89	31		SPT Sampler -89.9	18 / 34 / 33	67
			CLAY, fat, high plasticity, firm, trace subrounded medium to coarse-grained sand-sized limestone, weak reaction with HCl, moist, homogeneous, 10YR 5/4 yellowish brown (CH)	95	32		SPT Sampler -91.4	16 / 17 / 18	35
				95	33		SPT Sampler -92.9	17 / 19 / 20	39
				100	34		SPT Sampler -94.4	18 / 20 / 20	40
			From El. -94.3 to -98.7 Ft., hard, few subangular fine gravel-sized limestone, strong reaction with HCl, 5YR 6/8 reddish yellow	100	35		SPT Sampler -95.9	22 / 19 / 22	41
				95	36		SPT Sampler -97.4	18 / 20 / 22	42
				95	37		SPT Sampler	22 / 26	

Depth scale: 95, 100, 105, 110, 115

Boring Designation CB-DC04-12A

DRILLING LOG (Cont. Sheet)	**INSTALLATION** Jacksonville District		**SHEET** 7 **OF** 8 **SHEETS**
PROJECT Arecibo River PR	**COORDINATE SYSTEM/DATUM** State Plane, PR/VI (U.S. Ft.)	**HORIZONTAL** NAD27	**VERTICAL** NGVD29
LOCATION COORDINATES X = 401,558 Y = 223,750	**ELEVATION TOP OF BORING** 16.6 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
			From El. -98.7 to -100.0 Ft., few subangular fine to medium-grained sand-sized limestone	95	37		-98.9 SPT Sampler	30	56
-100.0	116.6			89	38		SPT Sampler -100.4	25, 33, 34	67
-101.8	118.4		SAND, silty, mostly subangular fine to coarse-grained sand-sized limestone, trace angular fine gravel-sized limestone, strong reaction with HCl, moist, moderate cementation, homogeneous, 10YR 7/4 very pale brown (SM)	78	39		SPT Sampler -101.9	17, 20, 17	37
-103.4	120.0		CLAY, fat, high plasticity, firm, little subangular medium to coarse-grained sand-sized limestone, trace subangular fine gravel-sized limestone, strong reaction with HCl, moist, homogeneous, 10YR 5/4 yellowish brown (CH)	95	40		SPT Sampler -103.4	17, 19, 20	39
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. Boring sealed with available sediment. 3. Additional Laboratory Testing 1 Moisture Content 2 Moisture Content 3 Moisture Content 4 Moisture Content 5 Moisture Content 6 Moisture Content 7 Moisture Content 8 Moisture Content 9 Moisture Content 10 Moisture Content 11 Moisture Content 12 Moisture Content 13 Moisture Content 14 Moisture Content 15 Moisture Content 16 Moisture Content 17 Moisture Content 18 Moisture Content 19 Moisture Content 20 Moisture Content 21 Moisture Content 22 Moisture Content 23 Moisture Content 24 Moisture Content 25 Moisture Content 26 Moisture Content 27 Moisture Content 28 Moisture Content 29 Moisture Content 30 Moisture Content 31 Moisture Content 32 Moisture Content 33 Moisture Content 34 Moisture Content 35 Moisture Content 36 Moisture Content 37 Moisture Content 38 Moisture Content 39 Moisture Content				140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).		

Depth scale: 115, 120, 125, 130, 135

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Boring Designation CB-DC04-12A

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District		SHEET 8 OF 8 SHEETS
PROJECT Arecibo River PR	COORDINATE SYSTEM/DATUM State Plane, PR/VI (U.S. Ft.)	HORIZONTAL NAD27	VERTICAL NGVD29
LOCATION COORDINATES X = 401,558 Y = 223,750	ELEVATION TOP OF BORING 16.6 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
			40 Moisture Content						

135

140

145

150

155

SAJ FORM 1836-A
JUN 02

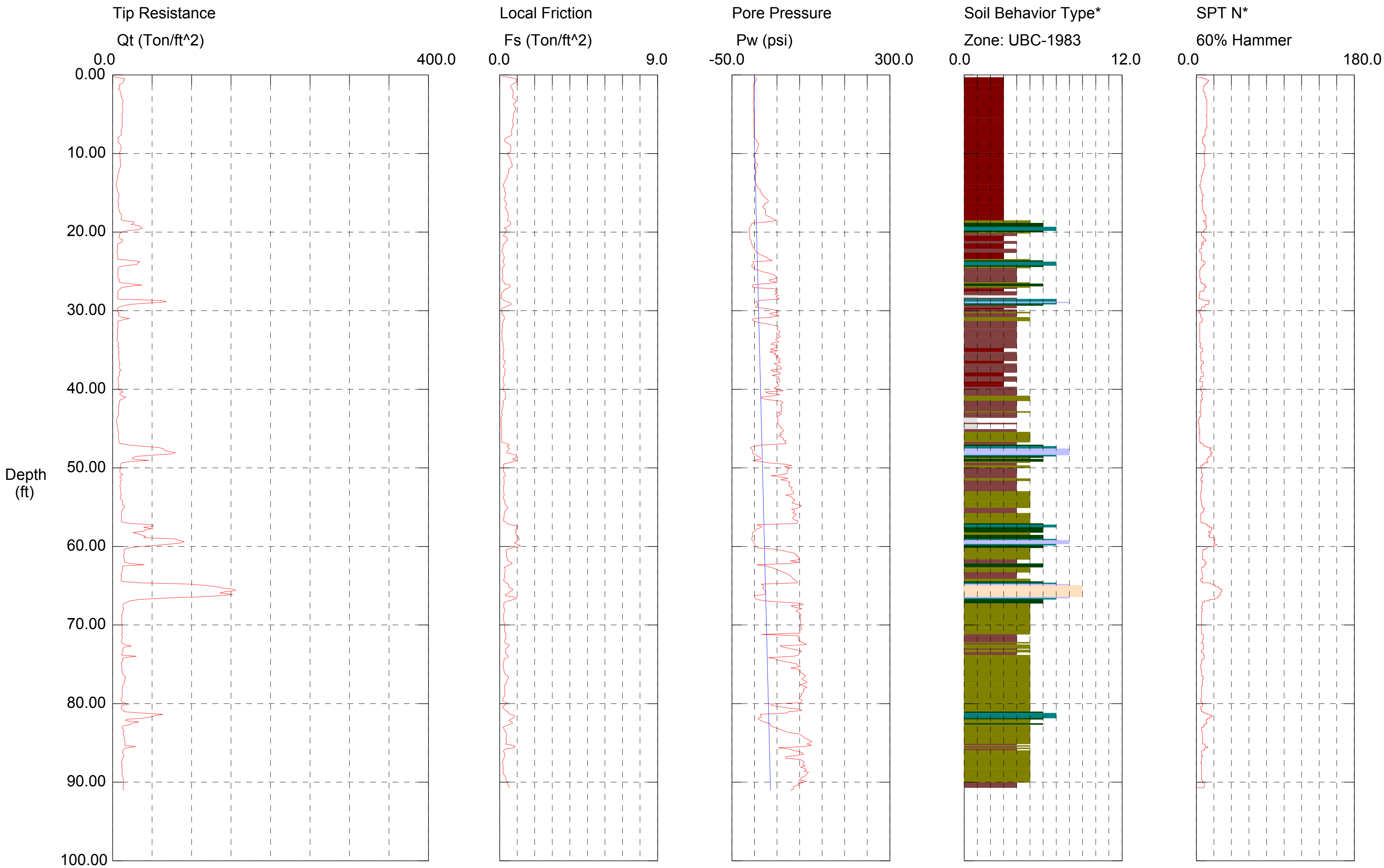
Appendix B
CPT Logs

*Soil behavior type and SPT based on data from UBC-1983

Geoconsult Inc.

Operator: Jorge Wichy
Sounding: CP-DC04-1
Cone Used: 4CH + SEIS

CPT Date/Time: 08-21-04 09:36
Location: R.G. Arecibo P.R.
Job Number: 3007-04



Maximum Depth = 91.04 feet

Depth Increment = 0.16 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

X: 122393.882 Y: 68201.981 [m]
Elevation: 5.068 msl

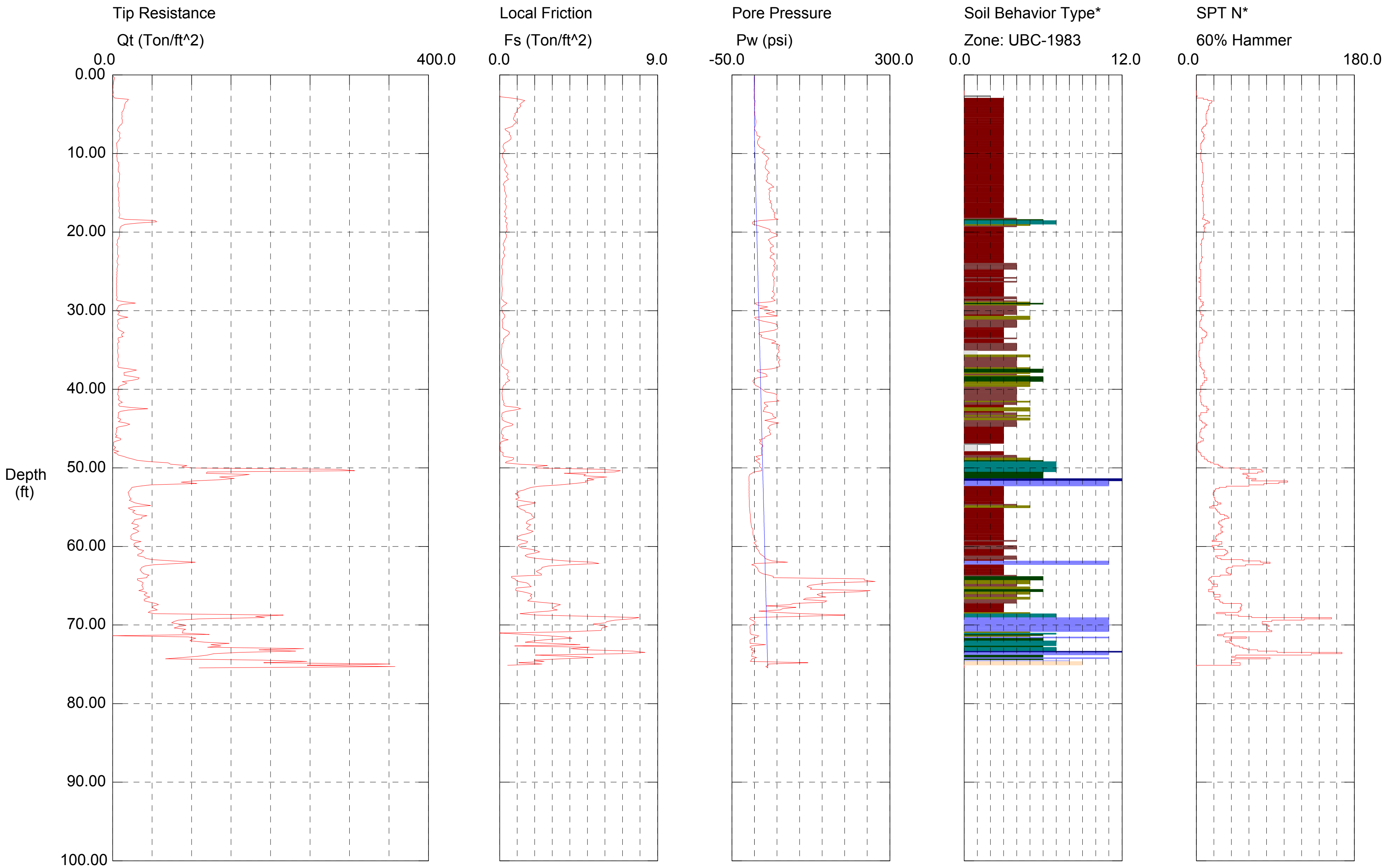
Arecibo River PR / PR-10 Culverts

*Soil behavior type and SPT based on data from UBC-1983

Geoconsult Inc.

Operator: Jorge Wichy
Sounding: CP-DC04-2
Cone Used: 4CH + SEIS

CPT Date/Time: 08-24-04 09:58
Location: R.G.Arecibo P.R.
Job Number: 3007-04



Maximum Depth = 75.46 feet

Depth Increment = 0.16 feet

1 sensitive fine grained	4 silty clay to clay	7 silty sand to sandy silt	10 gravelly sand to sand
2 organic material	5 clayey silt to silty clay	8 sand to silty sand	11 very stiff fine grained (*)
3 clay	6 sandy silt to clayey silt	9 sand	12 sand to clayey sand (*)

X: 122481.940 Y: 68219.591 [m]
Elevation: 5.653 msl

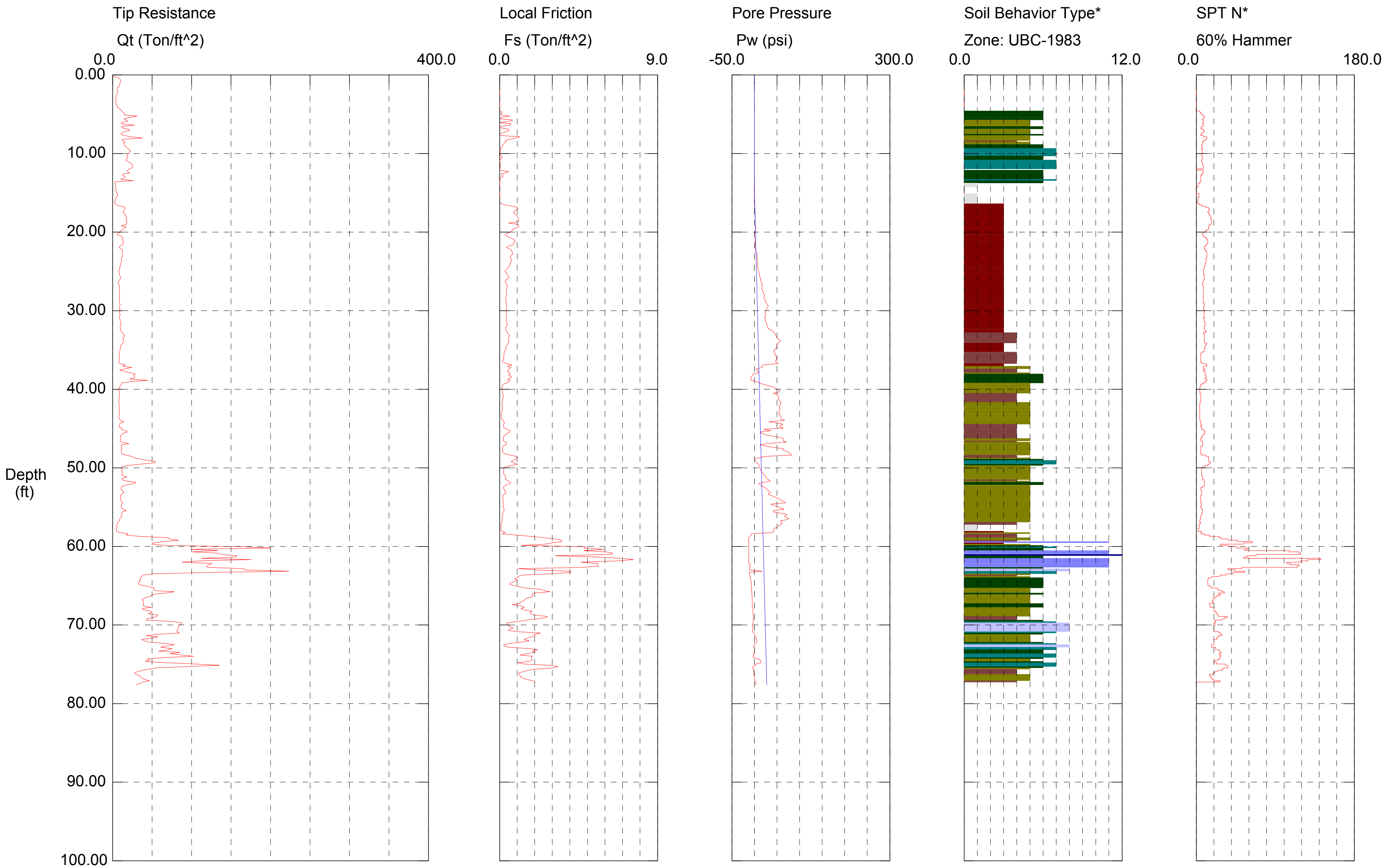
Arecibo River PR / PR-10 Culverts
The upper 3 feet were predrilled through an abandoned road pavement and base.

*Soil behavior type and SPT based on data from UBC-1983

Geoconsult Inc.

Operator: Jorge Wichy
Sounding: CP-DC04-3
Cone Used: 4CH + SEIS

CPT Date/Time: 08-14-04 09:14
Location: R.G.Arecibo P.R.
Job Number: 3007-04



Maximum Depth = 77.59 feet

Depth Increment = 0.16 feet

1 sensitive fine grained	4 silty clay to clay	7 silty sand to sandy silt	10 gravelly sand to sand
2 organic material	5 clayey silt to silty clay	8 sand to silty sand	11 very stiff fine grained (*)
3 clay	6 sandy silt to clayey silt	9 sand	12 sand to clayey sand (*)

X: 122444.728 Y: 68227.374 [m]
Elevation: 9.752 msl

Arecibo River PR / PR-10 Culverts
The upper 18 feet were predrilled through PR-10 road embankment fill.

GEOCONSULT

CP-DC04-1
List with CPT Measurements

Data File:CP-DC04-1 08-21-04 09:36
Operator:Jorge Wichy Location:R.G. Arecibo, P.R.
Cone ID:4CH + SEIS Job Number:3006-03
Customer:Hogentogler & Co Units:English

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
0.16	0.0	0.143	0.00	0	<out of range>	0.000
0.33	5.2	0.522	0.00	3	clay	7.000
0.49	15.3	0.901	4.41	3	clay	11.000
0.66	14.5	0.973	4.69	3	clay	14.000
0.82	13.7	0.973	2.42	3	clay	13.000
0.98	13.1	0.891	-0.14	3	clay	12.000
1.15	10.5	0.778	-1.00	3	clay	10.000
1.31	7.9	0.666	-2.42	3	clay	9.000
1.48	9.1	0.615	-1.71	3	clay	8.000
1.64	9.0	0.656	-1.85	3	clay	8.000
1.80	7.1	0.717	-1.00	3	clay	8.000
1.97	9.3	0.748	-1.56	3	clay	8.000
2.13	9.4	0.758	-1.71	3	clay	9.000
2.30	10.4	0.768	-1.85	3	clay	10.000
2.46	10.8	0.789	-1.99	3	clay	10.000
2.62	10.5	0.738	-2.28	3	clay	10.000
2.79	11.2	0.727	-2.28	3	clay	11.000
2.95	11.5	0.768	-1.99	3	clay	11.000
3.12	12.3	0.840	-2.28	3	clay	12.000
3.28	13.5	0.912	-1.99	3	clay	12.000
3.44	13.2	0.932	-2.56	3	clay	12.000
3.61	12.1	0.830	-3.13	3	clay	12.000
3.77	12.3	0.789	-2.42	3	clay	12.000
3.94	12.6	0.809	-2.28	3	clay	12.000
4.10	12.5	0.871	-1.99	3	clay	12.000
4.27	13.0	0.912	-1.85	3	clay	12.000
4.43	13.0	0.912	-1.85	3	clay	12.000
4.59	13.0	0.871	-1.85	3	clay	12.000
4.76	12.9	0.830	-1.85	3	clay	12.000
4.92	12.2	0.789	-1.56	3	clay	12.000
5.09	11.9	0.789	-0.43	3	clay	11.000
5.25	12.0	0.789	-1.00	3	clay	12.000
5.41	12.5	0.799	-1.28	3	clay	12.000
5.58	12.1	0.758	-1.14	3	clay	12.000
5.74	11.8	0.748	-1.28	3	clay	12.000
5.91	12.4	0.727	-1.00	3	clay	12.000
6.07	12.0	0.778	-1.28	3	clay	12.000
6.23	12.1	0.758	-0.71	3	clay	12.000
6.40	12.4	0.789	-0.71	3	clay	12.000
6.56	12.2	0.738	-0.71	3	clay	12.000
6.73	11.7	0.727	-1.28	3	clay	11.000
6.89	11.0	0.686	-1.14	3	clay	11.000
7.05	11.0	0.686	-1.14	3	clay	10.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
7.22	10.5	0.666	-0.85	3	clay	10.000
7.38	10.9	0.686	-0.71	3	clay	10.000
7.55	11.3	0.697	-0.57	3	clay	10.000
7.71	10.3	0.666	-0.85	3	clay	9.000
7.87	7.9	0.492	-1.42	3	clay	8.000
8.04	6.4	0.348	-1.42	3	clay	7.000
8.20	7.3	0.297	3.70	3	clay	7.000
8.37	6.8	0.277	4.84	3	clay	7.000
8.53	6.9	0.318	6.40	3	clay	7.000
8.69	8.2	0.461	8.25	3	clay	8.000
8.86	9.8	0.574	9.82	3	clay	9.000
9.02	10.4	0.635	8.54	3	clay	10.000
9.19	10.9	0.645	7.82	3	clay	10.000
9.35	10.6	0.635	6.69	3	clay	10.000
9.51	10.2	0.635	5.83	3	clay	10.000
9.68	9.9	0.615	5.12	3	clay	9.000
9.84	8.6	0.604	3.56	3	clay	9.000
10.01	8.6	0.410	1.14	3	clay	9.000
10.17	9.5	0.461	-1.56	3	clay	9.000
10.33	9.2	0.512	-1.71	3	clay	9.000
10.50	9.2	0.574	0.00	3	clay	9.000
10.66	9.4	0.594	1.14	3	clay	9.000
10.83	9.9	0.615	1.71	3	clay	9.000
10.99	9.6	0.635	1.71	3	clay	9.000
11.15	9.8	0.666	2.13	3	clay	9.000
11.32	9.8	0.707	7.26	3	clay	10.000
11.48	10.5	0.717	7.40	3	clay	10.000
11.65	10.1	0.707	5.69	3	clay	9.000
11.81	9.2	0.625	3.70	3	clay	9.000
11.98	8.6	0.522	2.70	3	clay	8.000
12.14	7.9	0.492	2.85	3	clay	8.000
12.30	7.9	0.512	3.56	3	clay	8.000
12.47	7.9	0.512	3.56	3	clay	7.000
12.63	6.9	0.481	2.56	3	clay	7.000
12.80	6.4	0.440	1.85	3	clay	6.000
12.96	6.6	0.410	1.71	3	clay	6.000
13.12	6.4	0.420	1.85	3	clay	6.000
13.29	6.5	0.369	2.28	3	clay	6.000
13.45	5.2	0.328	1.85	3	clay	5.000
13.62	4.8	0.266	2.42	3	clay	5.000
13.78	5.0	0.256	3.13	3	clay	5.000
13.94	4.7	0.215	4.13	3	clay	4.000
14.11	4.2	0.195	5.26	3	clay	4.000
14.27	4.8	0.225	6.12	3	clay	5.000
14.44	5.9	0.287	7.26	3	clay	5.000
14.60	6.0	0.287	13.37	3	clay	6.000
14.76	5.9	0.266	12.24	3	clay	6.000
14.93	6.4	0.318	14.23	3	clay	6.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
15.09	8.0	0.348	17.36	3	clay	7.000
15.26	8.0	0.338	16.36	3	clay	8.000
15.42	8.1	0.328	20.06	3	clay	7.000
15.58	7.3	0.287	22.48	3	clay	7.000
15.75	7.0	0.246	26.18	3	clay	7.000
15.91	6.7	0.246	29.88	3	clay	6.000
16.08	6.4	0.297	31.01	3	clay	7.000
16.24	7.5	0.359	29.45	3	clay	7.000
16.40	7.5	0.389	22.76	3	clay	7.000
16.57	7.9	0.379	22.48	3	clay	7.000
16.73	7.3	0.328	18.35	3	clay	7.000
16.90	7.2	0.318	19.06	3	clay	7.000
17.06	7.6	0.369	23.47	3	clay	7.000
17.22	8.1	0.379	23.90	3	clay	8.000
17.39	8.8	0.430	24.61	3	clay	8.000
17.55	9.4	0.492	23.76	3	clay	9.000
17.72	11.2	0.481	24.19	3	clay	10.000
17.88	11.0	0.471	25.61	3	clay	11.000
18.04	11.3	0.492	32.44	3	clay	11.000
18.21	11.0	0.471	37.56	3	clay	11.000
18.37	10.7	0.461	43.25	3	clay	11.000
18.54	12.4	0.430	47.80	5	clayey silt to silty clay	8.000
18.70	26.8	0.615	32.44	5	clayey silt to silty clay	11.000
18.86	27.1	0.615	-4.69	6	sandy silt to clayey silt	10.000
19.03	23.5	0.615	-6.97	6	sandy silt to clayey silt	11.000
19.19	33.5	0.543	-7.82	6	sandy silt to clayey silt	12.000
19.36	35.8	0.430	-9.39	7	silty sand to sandy silt	11.000
19.52	37.6	0.246	-11.24	7	silty sand to sandy silt	11.000
19.69	32.9	0.410	-11.67	7	silty sand to sandy silt	9.000
19.85	18.3	0.369	-11.67	6	sandy silt to clayey silt	8.000
20.01	11.2	0.338	-11.38	5	clayey silt to silty clay	6.000
20.18	9.1	0.297	-11.24	4	silty clay to clay	6.000
20.34	9.0	0.236	-10.95	4	silty clay to clay	6.000
20.51	8.2	0.215	-10.81	3	clay	8.000
20.67	8.0	0.410	-10.67	3	clay	8.000
20.83	9.5	0.410	-10.39	3	clay	10.000
21.00	13.3	0.451	-7.82	3	clay	11.000
21.16	11.8	0.389	-7.40	4	silty clay to clay	8.000
21.33	11.5	0.307	-6.69	4	silty clay to clay	6.000
21.49	6.3	0.256	-6.26	3	clay	8.000
21.65	6.5	0.184	-5.12	3	clay	6.000
21.82	6.3	0.195	-3.70	3	clay	6.000
21.98	6.4	0.174	-2.56	3	clay	6.000
22.15	6.5	0.174	-1.00	4	silty clay to clay	4.000
22.31	6.1	0.133	0.85	4	silty clay to clay	4.000
22.47	5.5	0.123	3.27	4	silty clay to clay	4.000
22.64	5.7	0.143	6.69	3	clay	6.000
22.80	6.2	0.195	11.10	3	clay	6.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
22.97	6.5	0.225	16.65	3	clay	6.000
23.13	6.7	0.256	23.05	3	clay	6.000
23.29	6.7	0.246	28.88	3	clay	6.000
23.46	6.2	0.246	31.30	5	clayey silt to silty clay	6.000
23.62	24.4	0.164	39.55	6	sandy silt to clayey silt	8.000
23.79	34.8	0.225	-3.27	7	silty sand to sandy silt	10.000
23.95	31.7	0.225	-1.71	7	silty sand to sandy silt	10.000
24.11	31.1	0.266	-3.56	7	silty sand to sandy silt	8.000
24.28	16.7	0.266	-6.54	6	sandy silt to clayey silt	7.000
24.44	7.6	0.215	-4.69	5	clayey silt to silty clay	5.000
24.61	7.4	0.123	-1.28	4	silty clay to clay	5.000
24.77	6.5	0.143	4.69	4	silty clay to clay	4.000
24.93	6.7	0.164	12.80	4	silty clay to clay	4.000
25.10	6.7	0.154	21.34	4	silty clay to clay	4.000
25.26	6.6	0.154	33.72	4	silty clay to clay	4.000
25.43	6.8	0.174	43.53	4	silty clay to clay	4.000
25.59	6.6	0.184	46.24	4	silty clay to clay	4.000
25.75	6.7	0.164	47.52	4	silty clay to clay	4.000
25.92	7.0	0.174	48.37	4	silty clay to clay	5.000
26.08	9.0	0.133	32.44	4	silty clay to clay	5.000
26.25	7.6	0.195	35.71	4	silty clay to clay	5.000
26.41	9.0	0.266	50.22	5	clayey silt to silty clay	6.000
26.57	21.7	0.256	21.48	6	sandy silt to clayey silt	9.000
26.74	37.0	0.594	-4.41	6	sandy silt to clayey silt	10.000
26.90	22.4	0.594	-4.98	5	clayey silt to silty clay	11.000
27.07	11.3	0.553	-2.70	4	silty clay to clay	9.000
27.23	9.3	0.348	48.94	3	clay	9.000
27.40	7.8	0.266	47.66	3	clay	8.000
27.56	6.6	0.184	45.81	4	silty clay to clay	4.000
27.72	6.6	0.123	50.51	4	silty clay to clay	4.000
27.89	6.5	0.102	45.95	4	silty clay to clay	4.000
28.05	6.7	0.092	52.92	1	sensitive fine grained	3.000
28.22	6.4	0.102	47.52	1	sensitive fine grained	3.000
28.38	6.2	0.072	51.36	4	silty clay to clay	4.000
28.54	7.4	0.164	55.48	7	silty sand to sandy silt	8.000
28.71	62.0	0.246	10.24	7	silty sand to sandy silt	15.000
28.87	68.0	0.471	2.99	8	sand to silty sand	14.000
29.04	44.2	0.635	5.41	7	silty sand to sandy silt	14.000
29.20	22.9	0.656	8.54	6	sandy silt to clayey silt	10.000
29.36	14.7	0.502	6.40	4	silty clay to clay	10.000
29.53	7.8	0.318	2.13	4	silty clay to clay	6.000
29.69	6.2	0.133	18.35	3	clay	6.000
29.86	5.9	0.102	39.55	4	silty clay to clay	4.000
30.02	6.2	0.082	51.79	4	silty clay to clay	4.000
30.18	6.4	0.143	52.92	5	clayey silt to silty clay	3.000
30.35	8.6	0.113	33.86	4	silty clay to clay	5.000
30.51	6.8	0.164	38.55	4	silty clay to clay	5.000
30.68	8.0	0.246	54.63	4	silty clay to clay	5.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
30.84	10.8	0.266	34.43	5	clayey silt to silty clay	6.000
31.00	21.2	0.277	0.00	5	clayey silt to silty clay	7.000
31.17	13.7	0.236	-4.98	5	clayey silt to silty clay	7.000
31.33	6.7	0.205	-1.56	4	silty clay to clay	6.000
31.50	6.5	0.164	9.11	4	silty clay to clay	4.000
31.66	6.8	0.154	26.18	4	silty clay to clay	4.000
31.82	6.5	0.143	40.26	4	silty clay to clay	4.000
31.99	6.6	0.154	51.64	4	silty clay to clay	4.000
32.15	6.7	0.154	52.21	4	silty clay to clay	4.000
32.32	6.6	0.154	49.51	4	silty clay to clay	4.000
32.48	6.1	0.133	50.79	4	silty clay to clay	4.000
32.64	6.0	0.123	56.48	4	silty clay to clay	4.000
32.81	6.2	0.123	54.77	4	silty clay to clay	4.000
32.97	6.3	0.133	53.78	4	silty clay to clay	4.000
33.14	6.4	0.133	53.64	4	silty clay to clay	4.000
33.30	6.2	0.143	57.19	4	silty clay to clay	4.000
33.46	5.9	0.133	53.49	4	silty clay to clay	4.000
33.63	5.9	0.133	46.66	4	silty clay to clay	4.000
33.79	5.5	0.133	49.08	4	silty clay to clay	4.000
33.96	6.2	0.164	53.49	4	silty clay to clay	4.000
34.12	7.5	0.195	39.84	4	silty clay to clay	5.000
34.28	7.6	0.195	36.56	4	silty clay to clay	5.000
34.45	6.4	0.184	48.37	4	silty clay to clay	4.000
34.61	6.6	0.184	50.51	4	silty clay to clay	5.000
34.78	8.2	0.225	43.11	3	clay	7.000
34.94	7.1	0.246	35.57	3	clay	7.000
35.10	7.4	0.225	51.22	3	clay	7.000
35.27	8.8	0.225	34.00	4	silty clay to clay	5.000
35.43	7.2	0.195	47.38	4	silty clay to clay	5.000
35.60	8.1	0.184	43.96	4	silty clay to clay	5.000
35.76	7.6	0.195	53.07	4	silty clay to clay	5.000
35.93	8.0	0.195	47.52	4	silty clay to clay	5.000
36.09	7.6	0.174	56.34	4	silty clay to clay	5.000
36.25	8.3	0.195	56.77	4	silty clay to clay	5.000
36.42	8.2	0.338	53.35	3	clay	8.000
36.58	8.5	0.287	57.33	3	clay	8.000
36.75	9.4	0.277	43.82	4	silty clay to clay	6.000
36.91	8.7	0.236	49.79	4	silty clay to clay	6.000
37.07	8.2	0.205	55.91	4	silty clay to clay	5.000
37.24	7.8	0.225	58.76	4	silty clay to clay	5.000
37.40	8.8	0.297	59.89	4	silty clay to clay	6.000
37.57	11.0	0.338	36.71	4	silty clay to clay	6.000
37.73	8.9	0.297	41.26	4	silty clay to clay	6.000
37.89	8.2	0.277	56.48	3	clay	8.000
38.06	8.7	0.287	57.05	3	clay	8.000
38.22	9.0	0.287	39.84	3	clay	8.000
38.39	7.7	0.225	52.21	4	silty clay to clay	5.000
38.55	7.1	0.184	54.92	4	silty clay to clay	5.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
38.71	6.7	0.184	52.92	4	silty clay to clay	4.000
38.88	7.0	0.184	56.77	4	silty clay to clay	4.000
39.04	7.5	0.215	55.77	3	clay	7.000
39.21	7.5	0.236	50.08	3	clay	7.000
39.37	7.5	0.256	52.64	3	clay	7.000
39.53	7.8	0.246	53.21	3	clay	7.000
39.70	7.6	0.236	49.08	4	silty clay to clay	5.000
39.86	7.4	0.184	43.11	4	silty clay to clay	5.000
40.03	7.5	0.205	51.93	4	silty clay to clay	5.000
40.19	9.5	0.225	63.88	4	silty clay to clay	6.000
40.35	13.3	0.318	24.47	4	silty clay to clay	7.000
40.52	9.0	0.328	30.73	4	silty clay to clay	7.000
40.68	9.2	0.318	56.20	4	silty clay to clay	6.000
40.85	11.9	0.338	41.40	5	clayey silt to silty clay	6.000
41.01	16.9	0.338	14.94	5	clayey silt to silty clay	7.000
41.17	14.1	0.338	15.79	5	clayey silt to silty clay	7.000
41.34	10.1	0.256	31.58	5	clayey silt to silty clay	5.000
41.50	8.6	0.184	57.62	4	silty clay to clay	6.000
41.67	8.8	0.195	63.31	4	silty clay to clay	5.000
41.83	8.4	0.215	60.75	4	silty clay to clay	5.000
41.99	8.0	0.195	57.05	4	silty clay to clay	5.000
42.16	7.6	0.174	61.03	4	silty clay to clay	5.000
42.32	7.5	0.174	59.47	4	silty clay to clay	5.000
42.49	7.6	0.164	59.47	4	silty clay to clay	5.000
42.65	7.5	0.123	60.18	4	silty clay to clay	5.000
42.81	7.5	0.123	60.61	5	clayey silt to silty clay	4.000
42.98	7.5	0.123	52.35	4	silty clay to clay	5.000
43.14	7.3	0.154	59.89	4	silty clay to clay	5.000
43.31	7.6	0.143	54.77	4	silty clay to clay	5.000
43.47	6.6	0.123	51.36	4	silty clay to clay	4.000
43.64	5.9	0.082	50.22	1	sensitive fine grained	3.000
43.80	5.3	0.072	51.79	1	sensitive fine grained	3.000
43.96	5.0	0.082	51.07	1	sensitive fine grained	2.000
44.13	5.1	0.092	51.93	1	sensitive fine grained	2.000
44.29	5.3	0.092	52.07	4	silty clay to clay	3.000
44.46	5.7	0.092	53.64	1	sensitive fine grained	3.000
44.62	5.8	0.092	55.06	1	sensitive fine grained	3.000
44.78	6.3	0.092	59.18	1	sensitive fine grained	3.000
44.95	6.4	0.092	58.33	1	sensitive fine grained	3.000
45.11	6.4	0.102	62.74	4	silty clay to clay	4.000
45.28	6.8	0.113	64.31	4	silty clay to clay	4.000
45.44	7.3	0.102	61.74	5	clayey silt to silty clay	3.000
45.60	7.6	0.113	56.05	5	clayey silt to silty clay	4.000
45.77	7.5	0.092	60.75	5	clayey silt to silty clay	4.000
45.93	7.1	0.102	53.35	5	clayey silt to silty clay	4.000
46.10	7.4	0.113	60.61	5	clayey silt to silty clay	4.000
46.26	7.6	0.123	63.45	5	clayey silt to silty clay	4.000
46.42	7.8	0.102	63.45	5	clayey silt to silty clay	4.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
46.59	7.8	0.102	69.85	5	clayey silt to silty clay	4.000
46.75	8.4	0.113	67.29	4	silty clay to clay	5.000
46.92	9.5	0.389	70.14	4	silty clay to clay	8.000
47.08	19.4	0.553	19.21	6	sandy silt to clayey silt	8.000
47.24	37.0	0.420	-1.42	7	silty sand to sandy silt	12.000
47.41	58.1	0.492	-8.68	7	silty sand to sandy silt	17.000
47.57	64.1	0.553	-7.11	8	sand to silty sand	15.000
47.74	65.3	0.512	-4.55	8	sand to silty sand	16.000
47.90	69.7	0.420	-3.56	8	sand to silty sand	17.000
48.06	79.2	0.399	-4.27	8	sand to silty sand	18.000
48.23	74.6	0.676	-2.42	8	sand to silty sand	16.000
48.39	51.8	0.983	4.69	7	silty sand to sandy silt	17.000
48.56	29.8	0.922	7.40	6	sandy silt to clayey silt	14.000
48.72	25.0	0.922	13.94	5	clayey silt to silty clay	13.000
48.88	25.7	0.727	13.37	6	sandy silt to clayey silt	12.000
49.05	45.5	0.953	-2.28	6	sandy silt to clayey silt	12.000
49.21	21.2	0.778	13.52	5	clayey silt to silty clay	13.000
49.38	11.6	0.522	30.45	4	silty clay to clay	9.000
49.54	10.1	0.225	70.14	4	silty clay to clay	7.000
49.70	10.1	0.215	81.95	5	clayey silt to silty clay	5.000
49.87	9.8	0.225	67.01	5	clayey silt to silty clay	5.000
50.03	9.6	0.215	77.11	4	silty clay to clay	6.000
50.20	9.5	0.215	74.12	4	silty clay to clay	6.000
50.36	9.3	0.225	71.99	4	silty clay to clay	6.000
50.52	9.0	0.225	72.56	4	silty clay to clay	6.000
50.69	10.2	0.297	71.56	4	silty clay to clay	7.000
50.85	13.1	0.307	65.02	4	silty clay to clay	7.000
51.02	9.9	0.318	37.42	4	silty clay to clay	7.000
51.18	9.2	0.225	59.04	4	silty clay to clay	6.000
51.35	10.7	0.225	73.98	5	clayey silt to silty clay	5.000
51.51	11.5	0.266	58.19	5	clayey silt to silty clay	5.000
51.67	10.1	0.256	70.99	4	silty clay to clay	7.000
51.84	9.6	0.236	79.24	4	silty clay to clay	6.000
52.00	10.0	0.256	76.26	4	silty clay to clay	6.000
52.17	9.5	0.246	77.54	4	silty clay to clay	6.000
52.33	9.1	0.225	76.11	4	silty clay to clay	6.000
52.49	10.0	0.225	83.51	4	silty clay to clay	6.000
52.66	9.7	0.225	82.37	4	silty clay to clay	6.000
52.82	9.7	0.225	81.38	4	silty clay to clay	6.000
52.99	10.0	0.225	85.65	5	clayey silt to silty clay	5.000
53.15	10.5	0.225	86.21	5	clayey silt to silty clay	5.000
53.31	11.1	0.256	85.93	5	clayey silt to silty clay	5.000
53.48	10.5	0.256	69.14	5	clayey silt to silty clay	5.000
53.64	10.0	0.215	80.95	5	clayey silt to silty clay	5.000
53.81	9.5	0.205	83.23	5	clayey silt to silty clay	5.000
53.97	10.4	0.225	87.92	5	clayey silt to silty clay	5.000
54.13	12.0	0.287	89.34	5	clayey silt to silty clay	6.000
54.30	12.4	0.297	86.64	5	clayey silt to silty clay	6.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
54.46	12.4	0.297	83.08	5	clayey silt to silty clay	6.000
54.63	12.4	0.307	92.05	5	clayey silt to silty clay	6.000
54.79	14.5	0.379	104.00	5	clayey silt to silty clay	7.000
54.95	15.2	0.430	101.72	5	clayey silt to silty clay	7.000
55.12	14.1	0.471	96.46	4	silty clay to clay	9.000
55.28	12.7	0.399	82.09	4	silty clay to clay	8.000
55.45	11.3	0.328	89.20	4	silty clay to clay	8.000
55.61	11.8	0.287	88.06	4	silty clay to clay	7.000
55.77	11.1	0.266	84.93	5	clayey silt to silty clay	5.000
55.94	11.1	0.256	93.33	5	clayey silt to silty clay	5.000
56.10	11.1	0.246	89.20	5	clayey silt to silty clay	5.000
56.27	11.2	0.256	85.79	5	clayey silt to silty clay	5.000
56.43	11.4	0.225	85.08	5	clayey silt to silty clay	5.000
56.59	11.4	0.215	87.49	5	clayey silt to silty clay	5.000
56.76	10.7	0.215	96.03	5	clayey silt to silty clay	5.000
56.92	12.3	0.369	96.32	5	clayey silt to silty clay	7.000
57.09	23.7	0.420	92.90	6	sandy silt to clayey silt	11.000
57.25	51.1	0.645	5.41	7	silty sand to sandy silt	13.000
57.41	51.5	1.045	14.94	7	silty sand to sandy silt	15.000
57.58	39.4	0.953	15.51	6	sandy silt to clayey silt	18.000
57.74	49.0	1.004	7.26	6	sandy silt to clayey silt	17.000
57.91	41.4	0.871	2.56	6	sandy silt to clayey silt	17.000
58.07	39.8	0.963	0.71	6	sandy silt to clayey silt	14.000
58.23	25.8	0.891	-5.12	5	clayey silt to silty clay	16.000
58.40	32.1	0.942	-4.69	5	clayey silt to silty clay	15.000
58.56	36.6	0.963	-4.55	6	sandy silt to clayey silt	14.000
58.73	41.7	1.076	-3.41	6	sandy silt to clayey silt	15.000
58.89	39.1	1.035	-5.83	6	sandy silt to clayey silt	21.000
59.06	80.2	1.137	-5.83	7	silty sand to sandy silt	21.000
59.22	82.4	1.055	-5.12	8	sand to silty sand	20.000
59.38	90.6	0.983	-3.41	8	sand to silty sand	21.000
59.55	86.8	0.840	-1.28	8	sand to silty sand	20.000
59.71	72.5	0.994	0.28	7	silty sand to sandy silt	23.000
59.88	54.1	1.178	1.28	6	sandy silt to clayey silt	20.000
60.04	31.6	0.994	2.85	6	sandy silt to clayey silt	13.000
60.20	19.5	0.666	7.68	5	clayey silt to silty clay	11.000
60.37	14.8	0.420	46.52	5	clayey silt to silty clay	8.000
60.53	14.4	0.359	61.89	5	clayey silt to silty clay	7.000
60.70	14.5	0.389	74.26	5	clayey silt to silty clay	7.000
60.86	14.7	0.399	87.21	5	clayey silt to silty clay	7.000
61.02	14.4	0.399	93.90	5	clayey silt to silty clay	7.000
61.19	13.6	0.379	92.62	5	clayey silt to silty clay	7.000
61.35	14.0	0.369	98.45	5	clayey silt to silty clay	7.000
61.52	14.5	0.440	97.45	5	clayey silt to silty clay	7.000
61.68	14.9	0.471	99.45	4	silty clay to clay	9.000
61.84	15.1	0.461	79.95	4	silty clay to clay	10.000
62.01	14.7	0.635	98.59	4	silty clay to clay	11.000
62.17	22.8	0.727	74.26	6	sandy silt to clayey silt	10.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
62.34	39.5	0.543	5.26	6	sandy silt to clayey silt	10.000
62.50	13.5	0.451	26.46	6	sandy silt to clayey silt	8.000
62.66	12.6	0.266	35.99	5	clayey silt to silty clay	6.000
62.83	12.6	0.297	44.25	5	clayey silt to silty clay	6.000
62.99	12.5	0.307	51.64	5	clayey silt to silty clay	6.000
63.16	11.8	0.318	58.05	5	clayey silt to silty clay	6.000
63.32	11.7	0.297	65.59	4	silty clay to clay	7.000
63.48	10.8	0.277	71.99	4	silty clay to clay	7.000
63.65	10.9	0.266	77.68	4	silty clay to clay	7.000
63.81	10.9	0.287	81.38	4	silty clay to clay	7.000
63.98	11.0	0.277	83.80	4	silty clay to clay	7.000
64.14	10.8	0.246	85.65	5	clayey silt to silty clay	5.000
64.30	10.8	0.215	90.06	5	clayey silt to silty clay	5.000
64.47	12.2	0.328	94.89	6	sandy silt to clayey silt	7.000
64.63	35.2	0.359	94.61	7	silty sand to sandy silt	16.000
64.80	98.4	0.522	14.51	8	sand to silty sand	20.000
64.96	115.4	0.492	20.34	9	sand	22.000
65.12	130.9	0.533	20.63	9	sand	25.000
65.29	139.6	0.615	17.64	9	sand	27.000
65.45	153.7	0.748	21.34	9	sand	29.000
65.62	155.8	0.697	23.19	9	sand	29.000
65.78	142.2	0.574	23.90	9	sand	28.000
65.94	135.9	0.502	24.19	9	sand	27.000
66.11	151.9	0.338	23.05	9	sand	27.000
66.27	136.8	0.328	-0.43	9	sand	25.000
66.44	104.9	0.789	0.14	8	sand to silty sand	24.000
66.60	63.5	0.973	1.99	7	silty sand to sandy silt	21.000
66.77	33.2	0.799	4.98	6	sandy silt to clayey silt	15.000
66.93	21.5	0.512	24.19	6	sandy silt to clayey silt	9.000
67.09	18.5	0.287	64.45	6	sandy silt to clayey silt	7.000
67.26	14.7	0.225	103.14	5	clayey silt to silty clay	7.000
67.42	13.1	0.256	108.12	5	clayey silt to silty clay	7.000
67.59	13.1	0.225	81.24	5	clayey silt to silty clay	6.000
67.75	13.1	0.236	89.77	5	clayey silt to silty clay	6.000
67.91	13.5	0.256	105.28	5	clayey silt to silty clay	7.000
68.08	14.3	0.297	94.47	5	clayey silt to silty clay	7.000
68.24	13.3	0.297	92.76	5	clayey silt to silty clay	6.000
68.41	12.3	0.246	99.16	5	clayey silt to silty clay	6.000
68.57	11.9	0.236	101.15	5	clayey silt to silty clay	6.000
68.73	11.6	0.225	102.86	5	clayey silt to silty clay	6.000
68.90	11.7	0.215	100.44	5	clayey silt to silty clay	6.000
69.06	11.6	0.215	101.86	5	clayey silt to silty clay	6.000
69.23	11.6	0.215	101.58	5	clayey silt to silty clay	6.000
69.39	11.5	0.225	101.86	5	clayey silt to silty clay	6.000
69.55	11.9	0.246	103.00	5	clayey silt to silty clay	6.000
69.72	11.6	0.256	101.29	5	clayey silt to silty clay	6.000
69.88	12.1	0.266	101.86	5	clayey silt to silty clay	6.000
70.05	12.2	0.277	101.01	5	clayey silt to silty clay	6.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
70.21	11.9	0.297	101.15	5	clayey silt to silty clay	6.000
70.37	11.9	0.287	104.71	5	clayey silt to silty clay	6.000
70.54	12.2	0.277	104.57	5	clayey silt to silty clay	6.000
70.70	11.7	0.287	99.59	5	clayey silt to silty clay	6.000
70.87	12.1	0.266	100.44	5	clayey silt to silty clay	6.000
71.03	13.1	0.348	101.01	5	clayey silt to silty clay	6.000
71.19	11.3	0.348	16.93	4	silty clay to clay	8.000
71.36	12.2	0.338	96.46	4	silty clay to clay	8.000
71.52	12.0	0.359	96.74	4	silty clay to clay	8.000
71.69	12.1	0.348	97.74	4	silty clay to clay	8.000
71.85	11.4	0.307	97.17	4	silty clay to clay	7.000
72.01	11.0	0.287	99.45	4	silty clay to clay	7.000
72.18	11.5	0.287	105.56	5	clayey silt to silty clay	6.000
72.34	12.8	0.328	111.68	4	silty clay to clay	8.000
72.51	15.1	0.522	115.38	5	clayey silt to silty clay	8.000
72.67	23.6	0.543	56.62	5	clayey silt to silty clay	8.000
72.83	14.4	0.451	65.16	5	clayey silt to silty clay	8.000
73.00	13.2	0.359	80.38	4	silty clay to clay	8.000
73.16	12.1	0.338	93.04	5	clayey silt to silty clay	6.000
73.33	13.1	0.338	104.14	5	clayey silt to silty clay	6.000
73.49	12.6	0.348	100.16	4	silty clay to clay	8.000
73.65	11.6	0.338	99.02	4	silty clay to clay	8.000
73.82	11.8	0.440	97.45	5	clayey silt to silty clay	9.000
73.98	30.0	0.481	86.93	5	clayey silt to silty clay	9.000
74.15	15.7	0.471	31.87	5	clayey silt to silty clay	9.000
74.31	11.9	0.246	45.67	5	clayey silt to silty clay	7.000
74.48	13.2	0.256	50.65	5	clayey silt to silty clay	6.000
74.64	12.7	0.225	67.01	5	clayey silt to silty clay	6.000
74.80	10.9	0.236	80.38	5	clayey silt to silty clay	6.000
74.97	11.2	0.205	94.18	5	clayey silt to silty clay	5.000
75.13	10.8	0.205	96.32	5	clayey silt to silty clay	5.000
75.30	11.3	0.205	102.15	5	clayey silt to silty clay	5.000
75.46	11.7	0.215	80.95	5	clayey silt to silty clay	5.000
75.62	11.3	0.215	95.18	5	clayey silt to silty clay	6.000
75.79	12.1	0.246	102.29	5	clayey silt to silty clay	6.000
75.95	12.1	0.266	100.30	5	clayey silt to silty clay	6.000
76.12	12.0	0.277	104.42	5	clayey silt to silty clay	6.000
76.28	13.1	0.338	109.26	5	clayey silt to silty clay	6.000
76.44	14.6	0.440	113.10	5	clayey silt to silty clay	7.000
76.61	16.2	0.502	110.83	5	clayey silt to silty clay	8.000
76.77	16.4	0.502	106.70	5	clayey silt to silty clay	8.000
76.94	15.4	0.440	105.85	5	clayey silt to silty clay	7.000
77.10	14.8	0.399	112.11	5	clayey silt to silty clay	7.000
77.26	14.7	0.399	116.23	5	clayey silt to silty clay	7.000
77.43	14.5	0.369	112.68	5	clayey silt to silty clay	7.000
77.59	13.6	0.307	101.01	5	clayey silt to silty clay	7.000
77.76	12.6	0.277	109.55	5	clayey silt to silty clay	6.000
77.92	12.5	0.266	116.23	5	clayey silt to silty clay	6.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
78.08	12.2	0.287	110.83	5	clayey silt to silty clay	6.000
78.25	12.0	0.277	108.41	5	clayey silt to silty clay	6.000
78.41	12.2	0.297	109.55	5	clayey silt to silty clay	6.000
78.58	12.4	0.297	107.55	5	clayey silt to silty clay	6.000
78.74	12.4	0.297	104.42	5	clayey silt to silty clay	6.000
78.90	12.4	0.297	104.00	5	clayey silt to silty clay	6.000
79.07	12.2	0.277	103.29	5	clayey silt to silty clay	6.000
79.23	11.8	0.215	99.87	5	clayey silt to silty clay	6.000
79.40	11.0	0.174	99.16	5	clayey silt to silty clay	5.000
79.56	10.7	0.174	105.14	5	clayey silt to silty clay	5.000
79.72	11.5	0.215	104.85	5	clayey silt to silty clay	6.000
79.89	13.4	0.440	102.58	5	clayey silt to silty clay	7.000
80.05	20.9	0.369	36.42	5	clayey silt to silty clay	7.000
80.22	11.7	0.277	36.71	5	clayey silt to silty clay	7.000
80.38	11.1	0.154	55.20	5	clayey silt to silty clay	5.000
80.54	11.4	0.195	71.42	5	clayey silt to silty clay	5.000
80.71	11.4	0.236	97.60	5	clayey silt to silty clay	6.000
80.87	14.3	0.338	105.28	5	clayey silt to silty clay	6.000
81.04	14.8	0.492	75.54	6	sandy silt to clayey silt	8.000
81.20	37.4	0.481	71.42	7	silty sand to sandy silt	12.000
81.36	63.5	0.615	12.24	7	silty sand to sandy silt	16.000
81.53	54.2	0.840	13.80	7	silty sand to sandy silt	18.000
81.69	48.9	0.840	16.22	7	silty sand to sandy silt	15.000
81.86	37.6	0.748	8.25	6	sandy silt to clayey silt	13.000
82.02	17.1	0.594	9.67	5	clayey silt to silty clay	11.000
82.19	16.5	0.522	15.93	5	clayey silt to silty clay	11.000
82.35	33.4	0.707	20.49	5	clayey silt to silty clay	12.000
82.51	23.5	0.727	33.29	6	sandy silt to clayey silt	10.000
82.68	22.5	0.522	34.86	5	clayey silt to silty clay	9.000
82.84	12.6	0.348	36.85	5	clayey silt to silty clay	8.000
83.01	12.0	0.184	43.53	5	clayey silt to silty clay	6.000
83.17	12.5	0.236	50.79	5	clayey silt to silty clay	6.000
83.33	13.3	0.266	58.47	5	clayey silt to silty clay	6.000
83.50	14.7	0.338	66.44	5	clayey silt to silty clay	7.000
83.66	14.0	0.359	73.84	5	clayey silt to silty clay	7.000
83.83	13.4	0.389	96.88	5	clayey silt to silty clay	7.000
83.99	13.7	0.399	102.15	5	clayey silt to silty clay	7.000
84.15	14.1	0.389	106.99	5	clayey silt to silty clay	7.000
84.32	14.5	0.369	109.97	5	clayey silt to silty clay	7.000
84.48	15.0	0.359	116.52	5	clayey silt to silty clay	7.000
84.65	15.2	0.348	120.93	5	clayey silt to silty clay	7.000
84.81	15.4	0.399	126.90	5	clayey silt to silty clay	7.000
84.97	15.8	0.399	122.78	5	clayey silt to silty clay	7.000
85.14	15.3	0.328	116.52	4	silty clay to clay	10.000
85.30	15.6	0.738	126.48	5	clayey silt to silty clay	10.000
85.47	29.0	0.881	106.84	4	silty clay to clay	13.000
85.63	17.6	0.799	53.49	5	clayey silt to silty clay	10.000
85.79	13.7	0.328	76.82	4	silty clay to clay	9.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
85.96	13.0	0.236	87.78	5	clayey silt to silty clay	6.000
86.12	12.4	0.215	99.16	5	clayey silt to silty clay	6.000
86.29	12.9	0.277	107.27	5	clayey silt to silty clay	6.000
86.45	13.8	0.297	108.69	5	clayey silt to silty clay	6.000
86.61	13.8	0.297	92.47	5	clayey silt to silty clay	7.000
86.78	14.3	0.256	69.00	5	clayey silt to silty clay	6.000
86.94	12.0	0.246	69.57	5	clayey silt to silty clay	6.000
87.11	12.0	0.215	101.72	5	clayey silt to silty clay	6.000
87.27	11.5	0.184	106.13	5	clayey silt to silty clay	6.000
87.43	11.2	0.164	110.26	5	clayey silt to silty clay	5.000
87.60	11.7	0.164	108.41	5	clayey silt to silty clay	6.000
87.76	11.6	0.184	107.27	5	clayey silt to silty clay	6.000
87.93	12.5	0.205	112.68	5	clayey silt to silty clay	6.000
88.09	11.2	0.205	102.29	5	clayey silt to silty clay	6.000
88.25	11.7	0.184	110.68	5	clayey silt to silty clay	6.000
88.42	12.3	0.184	115.95	5	clayey silt to silty clay	6.000
88.58	11.7	0.195	110.12	5	clayey silt to silty clay	6.000
88.75	12.1	0.184	119.65	5	clayey silt to silty clay	6.000
88.91	12.0	0.205	115.66	5	clayey silt to silty clay	6.000
89.07	11.9	0.246	114.38	5	clayey silt to silty clay	6.000
89.24	12.9	0.287	112.25	5	clayey silt to silty clay	6.000
89.40	13.0	0.348	104.00	5	clayey silt to silty clay	6.000
89.57	13.6	0.369	104.28	5	clayey silt to silty clay	6.000
89.73	13.8	0.348	98.88	5	clayey silt to silty clay	7.000
89.90	13.9	0.410	115.09	5	clayey silt to silty clay	7.000
90.06	13.8	0.430	106.13	4	silty clay to clay	9.000
90.22	13.5	0.451	95.60	4	silty clay to clay	9.000
90.39	13.9	0.492	98.17	4	silty clay to clay	9.000
90.55	13.3	0.512	86.93	4	silty clay to clay	9.000
90.72	13.3	0.553	85.65	0	<out of range>	0.000
90.88	14.2	-32768	86.36	0	<out of range>	0.000
91.04	14.3	-32768	79.53	0	<out of range>	0.000

CP-DC04-2
List with CPT Measurements

Data File:CP-DC04-2 08-24-04 09:58
Operator:Jorge Wichy Location:R.G. Arecibo, P.R.
Cone ID:4CH + SEIS Job Number:3006-03
Customer:Geoconsult Units:English

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
0.16	0.7	0.000	-0.57	0	<out of range>	0.000
0.33	2.1	0.000	-0.71	0	<out of range>	0.000
0.49	2.4	0.000	-0.71	0	<out of range>	0.000
0.66	1.7	0.000	-0.71	0	<out of range>	0.000
0.82	1.5	0.000	-0.71	0	<out of range>	0.000
0.98	0.9	0.000	-0.57	0	<out of range>	0.000
1.15	0.9	0.000	-0.57	0	<out of range>	0.000
1.31	0.7	0.000	-0.71	0	<out of range>	0.000
1.48	0.6	-0.010	-0.71	0	<out of range>	0.000
1.64	0.7	0.000	-0.57	0	<out of range>	0.000
1.80	0.2	0.000	-0.85	0	<out of range>	0.000
1.97	0.3	0.000	-0.85	0	<out of range>	0.000
2.13	0.7	0.000	-0.71	0	<out of range>	0.000
2.30	0.9	0.000	-0.57	0	<out of range>	0.000
2.46	0.2	0.000	-0.71	0	<out of range>	0.000
2.62	0.6	0.000	-0.71	2	organic material	1.000
2.79	1.0	0.031	-0.85	0	<out of range>	0.000
2.95	2.6	0.676	-0.85	3	clay	8.000
3.12	20.0	1.157	-0.71	3	clay	13.000
3.28	19.1	1.434	1.42	3	clay	18.000
3.44	17.0	1.311	1.42	3	clay	17.000
3.61	15.9	1.229	0.85	3	clay	15.000
3.77	15.4	1.137	1.00	3	clay	15.000
3.94	15.1	1.209	0.85	3	clay	14.000
4.10	14.8	1.168	0.43	3	clay	14.000
4.27	14.6	1.065	0.57	3	clay	14.000
4.43	13.7	1.004	0.43	3	clay	13.000
4.59	13.2	0.994	0.43	3	clay	12.000
4.76	11.6	0.973	1.00	3	clay	12.000
4.92	11.9	0.860	0.71	3	clay	11.000
5.09	11.6	0.901	0.71	3	clay	11.000
5.25	12.1	0.840	1.71	3	clay	11.000
5.41	11.8	0.809	1.71	3	clay	11.000
5.58	11.7	0.778	2.13	3	clay	11.000
5.74	12.3	0.809	3.13	3	clay	12.000
5.91	12.1	0.912	3.41	3	clay	12.000
6.07	12.2	0.942	3.41	3	clay	12.000
6.23	11.8	0.850	2.85	3	clay	11.000
6.40	9.7	0.778	2.56	3	clay	10.000
6.56	8.3	0.727	1.56	3	clay	8.000
6.73	7.4	0.512	0.28	3	clay	7.000
6.89	6.8	0.297	0.43	3	clay	6.000
7.05	6.1	0.348	1.71	3	clay	6.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
7.22	7.5	0.471	3.70	3	clay	7.000
7.38	9.3	0.584	4.84	3	clay	8.000
7.55	9.0	0.533	5.26	3	clay	9.000
7.71	8.6	0.615	5.55	3	clay	8.000
7.87	8.7	0.635	12.80	3	clay	9.000
8.04	9.7	0.656	10.53	3	clay	9.000
8.20	8.4	0.615	8.68	3	clay	8.000
8.37	7.5	0.533	7.54	3	clay	7.000
8.53	6.5	0.410	6.40	3	clay	6.000
8.69	4.8	0.277	6.40	3	clay	5.000
8.86	5.2	0.215	7.68	3	clay	5.000
9.02	5.3	0.195	9.82	3	clay	5.000
9.19	5.5	0.184	11.95	3	clay	5.000
9.35	5.5	0.225	16.65	3	clay	5.000
9.51	5.9	0.266	21.77	3	clay	6.000
9.68	6.1	0.307	21.06	3	clay	6.000
9.84	5.6	0.225	16.93	3	clay	5.000
10.01	5.5	0.164	19.21	3	clay	5.000
10.17	5.5	0.164	23.33	3	clay	5.000
10.33	5.1	0.143	25.89	3	clay	5.000
10.50	5.6	0.164	30.02	3	clay	5.000
10.66	5.7	0.225	31.30	3	clay	5.000
10.83	5.8	0.246	29.31	3	clay	6.000
10.99	5.9	0.266	25.75	3	clay	6.000
11.15	7.7	0.277	26.46	3	clay	7.000
11.32	7.5	0.328	26.60	3	clay	7.000
11.48	8.1	0.399	25.32	3	clay	7.000
11.65	7.7	0.399	23.90	3	clay	7.000
11.81	7.3	0.338	23.62	3	clay	7.000
11.98	7.0	0.297	25.04	3	clay	7.000
12.14	7.0	0.287	28.17	3	clay	7.000
12.30	7.1	0.338	31.16	3	clay	7.000
12.47	8.7	0.410	33.01	3	clay	8.000
12.63	9.1	0.481	28.74	3	clay	8.000
12.80	8.7	0.420	28.31	3	clay	8.000
12.96	8.6	0.379	27.60	3	clay	8.000
13.12	8.6	0.451	28.60	3	clay	8.000
13.29	8.3	0.502	28.88	3	clay	8.000
13.45	8.6	0.389	25.61	3	clay	8.000
13.62	7.8	0.287	27.17	3	clay	7.000
13.78	6.7	0.246	31.01	3	clay	7.000
13.94	6.6	0.195	37.42	3	clay	6.000
14.11	6.5	0.256	38.98	3	clay	6.000
14.27	6.7	0.277	43.25	3	clay	7.000
14.44	7.9	0.297	33.01	3	clay	7.000
14.60	7.1	0.277	31.58	3	clay	7.000
14.76	7.4	0.277	35.71	3	clay	7.000
14.93	7.6	0.318	32.58	3	clay	7.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
15.09	8.0	0.338	32.58	3	clay	7.000
15.26	7.7	0.359	32.44	3	clay	8.000
15.42	8.3	0.379	33.43	3	clay	8.000
15.58	7.6	0.369	33.43	3	clay	7.000
15.75	7.3	0.318	32.44	3	clay	7.000
15.91	7.1	0.307	33.58	3	clay	7.000
16.08	8.0	0.359	36.85	3	clay	8.000
16.24	8.4	0.338	33.86	3	clay	8.000
16.40	7.8	0.297	38.27	3	clay	8.000
16.57	8.1	0.359	38.27	3	clay	8.000
16.73	7.9	0.379	37.84	3	clay	8.000
16.90	8.8	0.369	36.71	3	clay	8.000
17.06	8.4	0.359	38.84	3	clay	8.000
17.22	8.1	0.328	41.68	3	clay	8.000
17.39	8.1	0.277	41.26	3	clay	8.000
17.55	8.6	0.318	46.52	3	clay	8.000
17.72	9.1	0.348	43.39	3	clay	9.000
17.88	9.1	0.328	44.81	3	clay	8.000
18.04	8.3	0.277	44.10	3	clay	8.000
18.21	7.8	0.410	44.10	4	silty clay to clay	7.000
18.37	15.8	0.359	52.50	6	sandy silt to clayey silt	10.000
18.54	53.8	0.338	13.23	7	silty sand to sandy silt	13.000
18.70	55.8	0.318	-3.41	7	silty sand to sandy silt	15.000
18.86	32.0	0.420	-4.55	7	silty sand to sandy silt	11.000
19.03	15.8	0.430	-2.99	5	clayey silt to silty clay	9.000
19.19	11.6	0.379	9.82	4	silty clay to clay	8.000
19.36	9.9	0.399	17.50	3	clay	10.000
19.52	9.4	0.410	26.60	3	clay	9.000
19.69	9.0	0.420	34.57	3	clay	9.000
19.85	9.0	0.410	34.43	3	clay	9.000
20.01	8.7	0.348	36.42	3	clay	8.000
20.18	8.4	0.328	45.24	3	clay	8.000
20.34	8.9	0.379	51.07	3	clay	8.000
20.51	8.8	0.379	50.08	3	clay	8.000
20.67	8.2	0.379	40.40	3	clay	8.000
20.83	7.6	0.338	34.29	3	clay	7.000
21.00	6.1	0.307	30.73	3	clay	6.000
21.16	5.9	0.266	33.29	3	clay	6.000
21.33	6.2	0.246	34.57	3	clay	6.000
21.49	5.5	0.195	35.85	3	clay	5.000
21.65	5.3	0.205	40.69	3	clay	6.000
21.82	6.8	0.246	42.40	3	clay	6.000
21.98	6.7	0.277	35.99	3	clay	6.000
22.15	6.2	0.287	35.14	3	clay	6.000
22.31	6.2	0.266	35.28	3	clay	6.000
22.47	6.1	0.215	35.71	3	clay	6.000
22.64	6.1	0.205	39.27	3	clay	6.000
22.80	6.1	0.246	44.25	3	clay	6.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
22.97	7.0	0.297	36.85	3	clay	6.000
23.13	7.2	0.266	35.85	3	clay	7.000
23.29	6.6	0.215	33.86	3	clay	6.000
23.46	6.2	0.154	41.40	3	clay	6.000
23.62	5.6	0.154	43.96	3	clay	6.000
23.79	5.7	0.164	44.53	3	clay	5.000
23.95	5.9	0.154	46.24	4	silty clay to clay	4.000
24.11	7.0	0.154	44.81	4	silty clay to clay	4.000
24.28	6.3	0.123	42.11	4	silty clay to clay	4.000
24.44	6.0	0.113	44.96	4	silty clay to clay	4.000
24.61	5.7	0.123	46.38	4	silty clay to clay	4.000
24.77	5.3	0.154	44.10	3	clay	5.000
24.93	6.0	0.154	43.68	3	clay	5.000
25.10	5.2	0.154	41.26	3	clay	5.000
25.26	5.7	0.154	40.55	3	clay	5.000
25.43	5.1	0.143	40.55	3	clay	5.000
25.59	5.7	0.123	40.69	3	clay	5.000
25.75	5.2	0.123	42.96	4	silty clay to clay	3.000
25.92	4.9	0.123	44.81	3	clay	5.000
26.08	5.4	0.123	41.97	3	clay	5.000
26.25	4.9	0.113	43.53	4	silty clay to clay	3.000
26.41	5.3	0.113	43.11	3	clay	5.000
26.57	4.8	0.123	43.39	3	clay	5.000
26.74	5.0	0.123	43.25	3	clay	5.000
26.90	5.4	0.133	43.11	3	clay	5.000
27.07	4.9	0.143	41.97	3	clay	5.000
27.23	5.1	0.154	41.97	3	clay	5.000
27.40	5.2	0.143	42.40	3	clay	5.000
27.56	5.1	0.143	39.69	3	clay	5.000
27.72	5.0	0.133	43.53	3	clay	5.000
27.89	5.2	0.133	43.82	3	clay	5.000
28.05	4.7	0.133	43.68	3	clay	5.000
28.22	5.7	0.113	42.25	4	silty clay to clay	3.000
28.38	5.8	0.102	37.27	4	silty clay to clay	3.000
28.54	4.8	0.102	42.25	3	clay	5.000
28.71	5.5	0.195	45.81	4	silty clay to clay	5.000
28.87	15.6	0.246	35.57	5	clayey silt to silty clay	8.000
29.04	28.7	0.410	1.14	6	sandy silt to clayey silt	7.000
29.20	12.8	0.338	3.70	5	clayey silt to silty clay	8.000
29.36	7.8	0.236	10.39	4	silty clay to clay	6.000
29.53	6.9	0.123	29.16	4	silty clay to clay	4.000
29.69	6.2	0.113	11.67	4	silty clay to clay	4.000
29.86	5.1	0.123	26.46	4	silty clay to clay	4.000
30.02	5.6	0.143	38.41	4	silty clay to clay	4.000
30.18	9.0	0.164	44.25	4	silty clay to clay	5.000
30.35	7.5	0.195	25.75	4	silty clay to clay	5.000
30.51	6.5	0.277	36.85	3	clay	8.000
30.68	10.6	0.297	50.65	5	clayey silt to silty clay	6.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
30.84	19.4	0.277	0.14	5	clayey silt to silty clay	6.000
31.00	10.0	0.225	1.42	5	clayey silt to silty clay	6.000
31.17	6.7	0.143	8.25	4	silty clay to clay	5.000
31.33	6.5	0.143	18.49	4	silty clay to clay	4.000
31.50	6.9	0.174	33.43	4	silty clay to clay	4.000
31.66	7.3	0.174	45.53	4	silty clay to clay	4.000
31.82	6.2	0.164	50.65	4	silty clay to clay	4.000
31.99	5.9	0.164	50.51	4	silty clay to clay	4.000
32.15	6.8	0.164	51.93	3	clay	6.000
32.32	6.9	0.215	50.65	3	clay	7.000
32.48	8.6	0.369	43.96	3	clay	9.000
32.64	11.7	0.502	29.31	3	clay	11.000
32.81	14.7	0.553	11.10	3	clay	12.000
32.97	11.6	0.533	9.67	3	clay	12.000
33.14	11.3	0.461	16.65	3	clay	11.000
33.30	13.0	0.348	14.08	3	clay	10.000
33.46	7.2	0.287	18.78	4	silty clay to clay	6.000
33.63	6.7	0.205	31.30	3	clay	7.000
33.79	7.4	0.246	42.68	3	clay	7.000
33.96	8.4	0.215	47.52	3	clay	7.000
34.12	6.5	0.195	38.13	4	silty clay to clay	4.000
34.28	6.3	0.123	51.50	4	silty clay to clay	4.000
34.45	6.8	0.133	56.34	4	silty clay to clay	4.000
34.61	6.7	0.133	53.21	4	silty clay to clay	4.000
34.78	6.9	0.113	54.49	4	silty clay to clay	4.000
34.94	6.5	0.102	52.50	4	silty clay to clay	4.000
35.10	6.1	0.092	54.77	1	sensitive fine grained	3.000
35.27	6.4	0.092	54.35	1	sensitive fine grained	3.000
35.43	6.7	0.092	51.36	1	sensitive fine grained	3.000
35.60	7.0	0.102	50.51	5	clayey silt to silty clay	3.000
35.76	7.0	0.113	49.79	5	clayey silt to silty clay	3.000
35.93	7.1	0.113	54.49	4	silty clay to clay	4.000
36.09	6.6	0.133	53.49	4	silty clay to clay	4.000
36.25	6.5	0.143	57.19	4	silty clay to clay	4.000
36.42	6.6	0.154	54.20	4	silty clay to clay	4.000
36.58	7.1	0.154	53.07	4	silty clay to clay	5.000
36.75	7.4	0.143	54.49	4	silty clay to clay	5.000
36.91	7.0	0.082	55.48	4	silty clay to clay	4.000
37.07	6.7	0.123	56.48	4	silty clay to clay	5.000
37.24	7.5	0.236	50.79	5	clayey silt to silty clay	6.000
37.40	20.9	0.297	37.56	6	sandy silt to clayey silt	7.000
37.57	30.1	0.471	5.83	6	sandy silt to clayey silt	9.000
37.73	23.1	0.492	6.69	6	sandy silt to clayey silt	9.000
37.89	14.3	0.492	14.37	5	clayey silt to silty clay	8.000
38.06	14.7	0.399	25.18	4	silty clay to clay	9.000
38.22	14.6	0.420	27.46	5	clayey silt to silty clay	9.000
38.39	24.7	0.481	28.03	6	sandy silt to clayey silt	9.000
38.55	33.5	0.461	6.40	6	sandy silt to clayey silt	12.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
38.71	32.3	0.461	0.71	6	sandy silt to clayey silt	12.000
38.88	24.4	0.574	-2.99	6	sandy silt to clayey silt	9.000
39.04	12.2	0.451	-3.27	5	clayey silt to silty clay	9.000
39.21	18.0	0.338	-1.00	5	clayey silt to silty clay	7.000
39.37	15.5	0.338	-0.14	5	clayey silt to silty clay	7.000
39.53	10.2	0.215	2.99	5	clayey silt to silty clay	5.000
39.70	7.6	0.184	8.96	4	silty clay to clay	5.000
39.86	7.0	0.164	12.95	4	silty clay to clay	5.000
40.03	7.5	0.164	17.21	4	silty clay to clay	5.000
40.19	7.4	0.154	20.91	4	silty clay to clay	5.000
40.35	6.9	0.143	25.75	4	silty clay to clay	4.000
40.52	6.8	0.133	42.25	4	silty clay to clay	4.000
40.68	6.2	0.143	49.37	4	silty clay to clay	4.000
40.85	7.6	0.143	50.08	4	silty clay to clay	5.000
41.01	8.2	0.154	49.79	4	silty clay to clay	5.000
41.17	7.7	0.164	49.37	4	silty clay to clay	5.000
41.34	7.3	0.164	49.94	4	silty clay to clay	5.000
41.50	9.6	0.225	54.35	5	clayey silt to silty clay	5.000
41.67	12.3	0.225	21.91	4	silty clay to clay	6.000
41.83	8.1	0.266	22.05	4	silty clay to clay	6.000
41.99	7.6	0.225	26.18	3	clay	8.000
42.16	8.6	0.338	29.88	3	clay	12.000
42.32	22.9	1.004	22.48	5	clayey silt to silty clay	12.000
42.49	44.3	1.188	22.34	5	clayey silt to silty clay	14.000
42.65	19.8	0.850	20.63	5	clayey silt to silty clay	12.000
42.81	10.0	0.379	19.06	3	clay	12.000
42.98	7.2	0.174	32.58	4	silty clay to clay	5.000
43.14	7.4	0.123	40.26	4	silty clay to clay	5.000
43.31	6.9	0.133	40.69	5	clayey silt to silty clay	3.000
43.47	7.2	0.102	41.83	4	silty clay to clay	4.000
43.64	6.5	0.154	48.51	5	clayey silt to silty clay	4.000
43.80	10.1	0.133	36.85	5	clayey silt to silty clay	4.000
43.96	9.6	0.184	22.91	4	silty clay to clay	6.000
44.13	7.4	0.338	35.85	4	silty clay to clay	7.000
44.29	16.1	0.553	53.49	4	silty clay to clay	10.000
44.46	21.8	0.768	40.55	4	silty clay to clay	12.000
44.62	17.0	0.707	34.14	4	silty clay to clay	10.000
44.78	7.7	0.348	31.73	3	clay	9.000
44.95	4.6	0.205	29.45	3	clay	6.000
45.11	5.7	0.143	33.72	3	clay	5.000
45.28	4.8	0.123	34.71	3	clay	5.000
45.44	4.8	0.102	32.86	3	clay	4.000
45.60	4.3	0.092	35.99	3	clay	4.000
45.77	3.7	0.143	35.85	3	clay	4.000
45.93	5.7	0.215	29.16	3	clay	4.000
46.10	3.4	0.164	22.91	3	clay	6.000
46.26	10.2	0.154	22.48	3	clay	8.000
46.42	10.3	0.481	10.39	3	clay	8.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
46.59	4.8	0.205	14.37	3	clay	5.000
46.75	1.2	0.051	11.52	3	clay	2.000
46.92	1.2	0.041	12.38	2	organic material	1.000
47.08	1.1	0.010	17.64	1	sensitive fine grained	1.000
47.24	1.6	0.010	18.92	1	sensitive fine grained	1.000
47.41	3.9	0.041	15.93	1	sensitive fine grained	1.000
47.57	2.2	0.031	14.51	1	sensitive fine grained	1.000
47.74	1.3	0.041	16.22	1	sensitive fine grained	2.000
47.90	7.6	0.041	16.08	3	clay	3.000
48.06	2.1	0.195	15.08	3	clay	5.000
48.23	5.8	0.184	15.65	3	clay	5.000
48.39	7.3	0.174	16.79	4	silty clay to clay	6.000
48.56	13.8	0.236	3.27	4	silty clay to clay	9.000
48.72	19.1	0.799	6.69	5	clayey silt to silty clay	9.000
48.88	25.6	0.799	12.09	5	clayey silt to silty clay	12.000
49.05	31.3	0.676	1.99	6	sandy silt to clayey silt	13.000
49.21	45.8	0.399	5.55	7	silty sand to sandy silt	16.000
49.38	70.4	0.318	9.53	7	silty sand to sandy silt	20.000
49.54	73.6	1.157	12.80	7	silty sand to sandy silt	25.000
49.70	93.9	2.714	11.24	7	silty sand to sandy silt	27.000
49.87	87.5	2.049	11.24	7	silty sand to sandy silt	30.000
50.03	101.8	2.110	15.51	7	silty sand to sandy silt	50.000
50.20	285.1	5.746	15.51	7	silty sand to sandy silt	74.000
50.36	306.6	6.873	16.08	7	silty sand to sandy silt	76.000
50.52	119.8	6.545	-1.42	6	sandy silt to clayey silt	70.000
50.69	118.6	3.688	-5.41	6	sandy silt to clayey silt	53.000
50.85	173.1	4.886	-10.53	6	sandy silt to clayey silt	58.000
51.02	159.8	4.794	-11.81	6	sandy silt to clayey silt	60.000
51.18	135.3	6.095	-12.09	6	sandy silt to clayey silt	57.000
51.35	154.1	4.999	-12.09	12	sand to clayey sand (*)	68.000
51.51	136.2	5.367	-12.24	12	sand to clayey sand (*)	63.000
51.67	102.7	4.876	-12.09	11	very stiff fine grained (*)	104.000
51.84	86.7	4.948	-11.81	11	very stiff fine grained (*)	94.000
52.00	106.4	4.282	-12.09	11	very stiff fine grained (*)	77.000
52.17	47.9	3.432	-11.81	11	very stiff fine grained (*)	60.000
52.33	34.0	2.274	-12.09	3	clay	34.000
52.49	24.5	1.813	-11.95	3	clay	26.000
52.66	23.4	1.567	-11.95	3	clay	22.000
52.82	22.4	1.393	-12.09	3	clay	21.000
52.99	20.7	1.065	-11.81	3	clay	20.000
53.15	19.5	1.055	-12.09	3	clay	19.000
53.31	20.6	0.881	-11.67	3	clay	19.000
53.48	20.5	1.065	-11.95	3	clay	20.000
53.64	21.3	1.035	-11.95	3	clay	20.000
53.81	22.0	1.117	-11.81	3	clay	21.000
53.97	23.5	0.912	-11.67	3	clay	21.000
54.13	20.9	1.055	-11.24	3	clay	22.000
54.30	24.6	1.516	-11.38	3	clay	24.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
54.46	28.1	2.049	-11.24	3	clay	28.000
54.63	35.9	1.741	-11.24	4	silty clay to clay	24.000
54.79	48.1	1.280	-11.52	5	clayey silt to silty clay	18.000
54.95	26.9	0.973	-11.38	5	clayey silt to silty clay	15.000
55.12	20.0	1.117	-10.95	3	clay	22.000
55.28	22.4	1.209	-10.67	3	clay	23.000
55.45	28.1	1.434	-10.39	3	clay	24.000
55.61	25.4	1.465	-10.10	3	clay	26.000
55.77	27.5	1.711	-9.82	3	clay	27.000
55.94	30.5	1.834	-9.25	3	clay	32.000
56.10	43.3	1.834	-9.11	3	clay	35.000
56.27	36.9	1.946	-9.11	3	clay	37.000
56.43	36.9	1.915	-9.11	3	clay	32.000
56.59	27.7	1.731	-8.54	3	clay	29.000
56.76	27.2	1.588	-8.54	3	clay	26.000
56.92	25.7	1.526	-7.97	3	clay	25.000
57.09	24.1	1.516	-7.68	3	clay	26.000
57.25	31.5	1.762	-7.11	3	clay	28.000
57.41	32.9	1.680	-6.83	3	clay	30.000
57.58	30.4	1.598	-6.26	3	clay	28.000
57.74	25.8	1.536	-3.98	3	clay	28.000
57.91	30.4	1.629	-3.13	3	clay	28.000
58.07	33.0	1.905	-3.27	3	clay	30.000
58.23	30.5	1.772	-3.56	3	clay	28.000
58.40	25.6	1.536	-3.27	3	clay	25.000
58.56	23.5	1.209	-2.99	3	clay	23.000
58.73	22.9	1.055	-1.85	3	clay	22.000
58.89	23.6	0.994	-1.00	3	clay	22.000
59.06	23.0	1.014	0.43	3	clay	23.000
59.22	26.5	1.280	3.13	4	silty clay to clay	18.000
59.38	36.0	1.588	3.70	3	clay	29.000
59.55	28.6	1.547	-1.42	3	clay	29.000
59.71	27.0	1.188	1.56	3	clay	26.000
59.88	27.2	1.065	4.55	4	silty clay to clay	18.000
60.04	29.1	1.106	3.27	4	silty clay to clay	19.000
60.20	31.2	1.270	4.27	4	silty clay to clay	20.000
60.37	32.9	1.793	6.83	3	clay	33.000
60.53	39.3	2.110	9.11	3	clay	35.000
60.70	37.6	2.274	10.39	3	clay	36.000
60.86	36.3	1.987	11.38	3	clay	34.000
61.02	31.9	1.567	14.08	3	clay	32.000
61.19	31.9	1.444	18.49	4	silty clay to clay	22.000
61.35	40.0	1.598	22.19	4	silty clay to clay	24.000
61.52	41.6	2.049	23.33	4	silty clay to clay	28.000
61.68	50.0	2.837	29.59	3	clay	53.000
61.84	75.0	3.739	38.70	11	very stiff fine grained (*)	73.000
62.01	104.6	5.265	73.27	11	very stiff fine grained (*)	84.000
62.17	82.2	5.644	2.28	11	very stiff fine grained (*)	76.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
62.34	51.5	3.913	-6.40	3	clay	56.000
62.50	41.0	2.786	1.85	3	clay	41.000
62.66	36.8	2.417	4.41	3	clay	36.000
62.83	35.9	2.397	7.54	3	clay	34.000
62.99	34.6	2.254	7.68	3	clay	34.000
63.16	36.1	2.090	9.39	3	clay	34.000
63.32	37.2	2.161	12.38	3	clay	36.000
63.48	39.4	2.366	18.78	3	clay	39.000
63.65	45.9	2.387	31.58	4	silty clay to clay	27.000
63.81	43.6	0.676	41.68	6	sandy silt to clayey silt	17.000
63.98	43.2	0.676	41.54	6	sandy silt to clayey silt	15.000
64.14	31.3	0.860	243.56	6	sandy silt to clayey silt	14.000
64.30	31.8	0.932	243.71	5	clayey silt to silty clay	16.000
64.47	36.1	1.086	267.32	5	clayey silt to silty clay	17.000
64.63	38.7	1.536	165.74	5	clayey silt to silty clay	18.000
64.80	38.0	1.659	143.12	4	silty clay to clay	24.000
64.96	36.9	1.700	122.49	4	silty clay to clay	24.000
65.12	37.9	1.793	116.38	5	clayey silt to silty clay	18.000
65.29	38.7	0.963	126.62	5	clayey silt to silty clay	18.000
65.45	38.7	0.912	123.77	6	sandy silt to clayey silt	14.000
65.62	33.2	0.922	256.23	6	sandy silt to clayey silt	14.000
65.78	40.7	1.311	231.19	5	clayey silt to silty clay	19.000
65.94	43.7	1.629	150.66	5	clayey silt to silty clay	20.000
66.11	40.0	1.844	138.71	4	silty clay to clay	27.000
66.27	41.2	1.741	144.26	4	silty clay to clay	27.000
66.44	47.2	1.813	158.34	5	clayey silt to silty clay	21.000
66.60	42.8	1.823	114.10	5	clayey silt to silty clay	21.000
66.77	39.9	1.700	108.55	4	silty clay to clay	26.000
66.93	40.2	1.598	160.19	4	silty clay to clay	27.000
67.09	47.3	2.284	154.79	4	silty clay to clay	30.000
67.26	54.6	3.083	86.07	3	clay	51.000
67.42	58.1	3.462	79.24	3	clay	52.000
67.59	51.6	3.237	26.60	3	clay	51.000
67.75	50.2	3.063	91.91	3	clay	50.000
67.91	53.3	3.012	62.31	3	clay	51.000
68.08	56.3	3.278	56.91	3	clay	50.000
68.24	47.7	2.796	9.96	3	clay	48.000
68.41	45.0	1.803	47.66	5	clayey silt to silty clay	23.000
68.57	53.2	1.157	109.40	7	silty sand to sandy silt	33.000
68.73	216.0	2.110	199.89	7	silty sand to sandy silt	48.000
68.90	181.1	5.337	97.31	7	silty sand to sandy silt	63.000
69.06	192.3	7.928	-8.68	11	very stiff fine grained (*)	154.000
69.23	110.1	7.508	-10.95	11	very stiff fine grained (*)	123.000
69.39	83.4	6.576	-5.55	11	very stiff fine grained (*)	86.000
69.55	77.5	6.105	0.57	11	very stiff fine grained (*)	75.000
69.72	74.7	6.023	1.00	11	very stiff fine grained (*)	75.000
69.88	83.5	5.327	-0.57	11	very stiff fine grained (*)	80.000
70.05	93.1	5.736	-8.68	11	very stiff fine grained (*)	83.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
70.21	83.6	6.136	-10.10	11	very stiff fine grained (*)	81.000
70.37	78.1	5.828	-9.96	11	very stiff fine grained (*)	81.000
70.54	92.5	5.808	-9.67	11	very stiff fine grained (*)	83.000
70.70	89.1	5.787	-9.53	11	very stiff fine grained (*)	86.000
70.87	88.7	3.903	-9.53	5	clayey silt to silty clay	42.000
71.03	88.1	0.000	-9.67	7	silty sand to sandy silt	32.000
71.19	122.4	1.444	-7.11	6	sandy silt to clayey silt	24.000
71.36	-23.8	2.735	9.11	5	clayey silt to silty clay	31.000
71.52	95.9	3.667	7.11	11	very stiff fine grained (*)	57.000
71.69	105.3	4.118	-1.85	6	sandy silt to clayey silt	38.000
71.85	99.8	2.776	-9.25	6	sandy silt to clayey silt	39.000
72.01	98.0	1.987	-9.96	7	silty sand to sandy silt	33.000
72.18	116.5	1.465	-9.67	7	silty sand to sandy silt	38.000
72.34	147.3	2.889	-9.82	7	silty sand to sandy silt	41.000
72.51	124.4	4.579	24.61	7	silty sand to sandy silt	43.000
72.67	136.8	0.850	-7.54	6	sandy silt to clayey silt	49.000
72.83	120.4	5.101	-10.10	7	silty sand to sandy silt	53.000
73.00	242.1	4.056	-3.70	7	silty sand to sandy silt	58.000
73.16	185.5	4.917	-7.68	7	silty sand to sandy silt	70.000
73.33	231.8	7.590	1.56	12	sand to clayey sand (*)	92.000
73.49	161.1	8.277	-4.84	11	very stiff fine grained (*)	166.000
73.65	128.1	7.027	-5.12	11	very stiff fine grained (*)	131.000
73.82	120.2	2.028	-5.69	6	sandy silt to clayey silt	45.000
73.98	107.9	3.933	-6.54	6	sandy silt to clayey silt	40.000
74.15	88.0	5.327	4.69	11	very stiff fine grained (*)	84.000
74.31	67.0	3.503	-4.98	6	sandy silt to clayey silt	44.000
74.48	189.9	1.956	-7.26	8	sand to silty sand	40.000
74.64	245.9	2.530	-8.96	9	sand	40.000
74.80	191.3	1.086	118.65	9	sand	50.000
74.97	351.5	2.417	29.73	9	sand	50.000
75.13	246.3	0.451	30.45	0	<out of range>	0.000
75.30	357.4	-32768	24.90	0	<out of range>	0.000
75.46	109.3	-32768	29.73	0	<out of range>	0.000

CP-DC04-3
List with CPT Measurements

Data File:CP-DC04-3 08-14-04 09:14
Operator:Jorge Wichy Location:R.G. Arecibo, P.R.
Cone ID:4CH + SEIS Job Number:3006-03
Customer:Geoconsult Units:English

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
0.16	0.6	0.000	-0.14	0	<out of range>	0.000
0.33	6.3	0.000	0.00	0	<out of range>	0.000
0.49	8.9	0.000	0.00	0	<out of range>	0.000
0.66	10.0	-0.010	0.00	0	<out of range>	0.000
0.82	10.0	0.000	-0.14	0	<out of range>	0.000
0.98	9.5	0.000	-0.43	0	<out of range>	0.000
1.15	9.1	0.000	-0.43	0	<out of range>	0.000
1.31	8.8	-0.010	-0.28	0	<out of range>	0.000
1.48	7.9	0.000	-0.28	0	<out of range>	0.000
1.64	6.3	0.000	-0.43	0	<out of range>	0.000
1.80	5.8	0.000	-0.28	0	<out of range>	0.000
1.97	5.6	0.000	-0.43	0	<out of range>	0.000
2.13	5.8	0.000	-0.14	0	<out of range>	0.000
2.30	6.1	-0.010	-0.28	0	<out of range>	0.000
2.46	5.5	0.000	-0.14	0	<out of range>	0.000
2.62	4.6	0.000	-0.28	0	<out of range>	0.000
2.79	4.0	0.000	-0.14	0	<out of range>	0.000
2.95	4.2	-0.010	-0.14	0	<out of range>	0.000
3.12	4.1	0.000	-0.14	0	<out of range>	0.000
3.28	4.1	0.000	-0.28	0	<out of range>	0.000
3.44	3.9	0.000	-0.14	0	<out of range>	0.000
3.61	4.1	0.000	-0.14	0	<out of range>	0.000
3.77	4.9	-0.010	-0.14	0	<out of range>	0.000
3.94	5.6	-0.010	-0.43	0	<out of range>	0.000
4.10	6.1	-0.010	-0.28	0	<out of range>	0.000
4.27	8.0	-0.010	-0.14	0	<out of range>	0.000
4.43	10.3	-0.010	-0.28	0	<out of range>	0.000
4.59	11.4	-0.010	0.14	6	sandy silt to clayey silt	4.000
4.76	13.2	0.143	-0.14	6	sandy silt to clayey silt	5.000
4.92	15.1	0.041	0.00	6	sandy silt to clayey silt	6.000
5.09	14.8	0.092	-0.14	6	sandy silt to clayey silt	8.000
5.25	30.8	0.563	-0.14	6	sandy silt to clayey silt	9.000
5.41	22.1	0.072	-0.14	6	sandy silt to clayey silt	9.000
5.58	14.5	-0.051	-0.14	6	sandy silt to clayey silt	7.000
5.74	17.0	0.738	0.00	5	clayey silt to silty clay	8.000
5.91	19.0	0.584	0.00	5	clayey silt to silty clay	8.000
6.07	11.4	-0.082	-0.14	5	clayey silt to silty clay	7.000
6.23	11.1	0.645	0.00	5	clayey silt to silty clay	8.000
6.40	27.6	0.584	0.14	5	clayey silt to silty clay	8.000
6.56	11.6	0.051	-0.14	6	sandy silt to clayey silt	6.000
6.73	11.6	-0.072	0.00	6	sandy silt to clayey silt	5.000
6.89	19.2	0.492	0.28	5	clayey silt to silty clay	8.000
7.05	21.8	0.543	0.00	5	clayey silt to silty clay	9.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
7.22	14.9	0.420	0.28	5	clayey silt to silty clay	8.000
7.38	11.1	0.123	0.00	5	clayey silt to silty clay	6.000
7.55	10.8	-0.020	-0.14	6	sandy silt to clayey silt	5.000
7.71	14.3	-0.020	0.00	5	clayey silt to silty clay	8.000
7.87	23.1	1.137	0.14	5	clayey silt to silty clay	12.000
8.04	37.8	0.922	0.00	5	clayey silt to silty clay	12.000
8.20	12.1	0.584	0.00	5	clayey silt to silty clay	10.000
8.37	12.1	0.307	0.14	4	silty clay to clay	8.000
8.53	15.8	0.359	0.00	5	clayey silt to silty clay	7.000
8.69	13.8	0.256	-0.14	5	clayey silt to silty clay	7.000
8.86	14.8	0.205	0.00	6	sandy silt to clayey silt	6.000
9.02	15.4	0.164	0.14	6	sandy silt to clayey silt	6.000
9.19	17.4	0.113	0.00	6	sandy silt to clayey silt	7.000
9.35	19.2	0.041	0.00	7	silty sand to sandy silt	6.000
9.51	20.6	0.082	0.00	7	silty sand to sandy silt	7.000
9.68	22.7	0.031	0.00	7	silty sand to sandy silt	7.000
9.84	21.1	0.020	0.00	7	silty sand to sandy silt	7.000
10.01	21.1	0.031	-0.14	7	silty sand to sandy silt	6.000
10.17	18.1	0.010	0.00	7	silty sand to sandy silt	6.000
10.33	18.0	0.102	-0.14	6	sandy silt to clayey silt	7.000
10.50	18.9	0.154	-0.14	6	sandy silt to clayey silt	7.000
10.66	18.4	0.061	0.00	6	sandy silt to clayey silt	7.000
10.83	16.6	0.010	-0.14	7	silty sand to sandy silt	6.000
10.99	18.3	0.000	-0.14	7	silty sand to sandy silt	6.000
11.15	21.5	0.020	-0.28	7	silty sand to sandy silt	7.000
11.32	24.1	0.020	-0.28	7	silty sand to sandy silt	7.000
11.48	24.8	0.020	-0.14	7	silty sand to sandy silt	8.000
11.65	25.8	0.041	0.00	7	silty sand to sandy silt	8.000
11.81	25.0	-0.010	-0.28	7	silty sand to sandy silt	8.000
11.98	21.3	-0.010	-0.14	0	<out of range>	0.000
12.14	19.4	0.010	-0.28	6	sandy silt to clayey silt	8.000
12.30	18.6	0.512	-0.28	6	sandy silt to clayey silt	8.000
12.47	21.8	0.287	0.00	6	sandy silt to clayey silt	7.000
12.63	12.6	0.092	0.00	6	sandy silt to clayey silt	6.000
12.80	12.9	0.164	-0.14	6	sandy silt to clayey silt	5.000
12.96	16.0	0.195	-0.14	6	sandy silt to clayey silt	5.000
13.12	14.1	-0.010	-0.28	6	sandy silt to clayey silt	5.000
13.29	10.4	0.031	-0.14	7	silty sand to sandy silt	5.000
13.45	26.1	0.000	0.00	6	sandy silt to clayey silt	5.000
13.62	3.7	0.010	-0.43	6	sandy silt to clayey silt	4.000
13.78	3.0	0.000	-0.43	1	sensitive fine grained	2.000
13.94	3.7	0.010	-0.28	1	sensitive fine grained	2.000
14.11	3.5	0.000	-0.43	1	sensitive fine grained	2.000
14.27	3.8	0.000	-0.14	0	<out of range>	0.000
14.44	3.6	0.000	-0.43	0	<out of range>	0.000
14.60	4.3	0.000	-0.43	0	<out of range>	0.000
14.76	4.3	0.000	-0.43	0	<out of range>	0.000
14.93	4.8	0.000	-0.28	0	<out of range>	0.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
15.09	5.8	0.000	-0.28	1	sensitive fine grained	3.000
15.26	6.1	0.010	-0.43	1	sensitive fine grained	3.000
15.42	5.6	0.010	-0.57	1	sensitive fine grained	3.000
15.58	4.6	0.000	-0.28	1	sensitive fine grained	2.000
15.75	4.1	0.010	-0.28	1	sensitive fine grained	2.000
15.91	3.2	0.010	-0.28	1	sensitive fine grained	2.000
16.08	2.8	0.000	-0.14	1	sensitive fine grained	1.000
16.24	3.0	0.010	-0.43	1	sensitive fine grained	1.000
16.40	3.2	0.092	-0.28	3	clay	4.000
16.57	4.9	0.389	-0.28	3	clay	7.000
16.73	12.6	0.778	-0.28	3	clay	11.000
16.90	16.3	1.024	0.57	3	clay	14.000
17.06	15.3	1.045	0.43	3	clay	15.000
17.22	14.2	0.953	0.28	3	clay	14.000
17.39	13.9	0.789	0.71	3	clay	13.000
17.55	13.7	0.809	0.71	3	clay	14.000
17.72	15.8	0.901	1.28	3	clay	15.000
17.88	16.0	0.973	1.28	3	clay	16.000
18.04	16.8	1.014	1.28	3	clay	16.000
18.21	17.4	1.045	1.85	3	clay	17.000
18.37	18.1	1.086	1.71	3	clay	17.000
18.54	16.9	1.086	1.71	3	clay	17.000
18.70	17.8	1.065	1.85	3	clay	17.000
18.86	17.7	0.512	1.99	3	clay	17.000
19.03	17.5	1.045	1.99	3	clay	15.000
19.19	10.8	1.076	2.13	3	clay	14.000
19.36	16.9	1.055	2.85	3	clay	14.000
19.52	15.2	0.912	2.70	3	clay	14.000
19.69	13.0	0.727	2.99	3	clay	12.000
19.85	9.9	0.686	2.42	3	clay	10.000
20.01	9.3	0.584	2.42	3	clay	8.000
20.18	6.1	0.389	0.85	3	clay	7.000
20.34	5.7	0.338	-0.43	3	clay	7.000
20.51	10.8	0.389	-0.43	3	clay	9.000
20.67	12.1	0.543	0.57	3	clay	11.000
20.83	13.0	0.717	1.00	3	clay	12.000
21.00	12.5	0.830	1.71	3	clay	13.000
21.16	14.1	0.881	1.85	3	clay	13.000
21.33	13.3	0.830	1.85	3	clay	13.000
21.49	13.5	0.778	1.71	3	clay	12.000
21.65	11.4	0.738	1.85	3	clay	11.000
21.82	8.9	0.471	1.56	3	clay	9.000
21.98	8.2	0.379	1.56	3	clay	9.000
22.15	11.1	0.533	1.99	3	clay	10.000
22.31	12.2	0.686	3.13	3	clay	11.000
22.47	12.1	0.697	2.99	3	clay	12.000
22.64	12.5	0.717	5.41	3	clay	12.000
22.80	12.6	0.748	5.55	3	clay	12.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
22.97	12.2	0.645	5.69	3	clay	12.000
23.13	12.7	0.604	5.83	3	clay	12.000
23.29	11.3	0.615	5.98	3	clay	11.000
23.46	11.4	0.645	6.40	3	clay	11.000
23.62	11.4	0.686	6.40	3	clay	11.000
23.79	11.3	0.656	6.54	3	clay	11.000
23.95	10.5	0.594	6.40	3	clay	10.000
24.11	10.1	0.584	6.26	3	clay	10.000
24.28	9.5	0.543	7.26	3	clay	9.000
24.44	9.5	0.522	7.26	3	clay	9.000
24.61	9.0	0.440	7.97	3	clay	9.000
24.77	8.3	0.389	8.39	3	clay	8.000
24.93	8.1	0.307	8.96	3	clay	8.000
25.10	7.8	0.328	9.67	3	clay	8.000
25.26	8.6	0.410	10.39	3	clay	8.000
25.43	8.8	0.430	11.10	3	clay	9.000
25.59	9.4	0.471	11.38	3	clay	9.000
25.75	9.9	0.543	12.24	3	clay	9.000
25.92	10.0	0.471	14.23	3	clay	9.000
26.08	8.6	0.348	13.66	3	clay	8.000
26.25	7.6	0.307	13.94	3	clay	8.000
26.41	7.4	0.318	16.08	3	clay	7.000
26.57	7.5	0.369	16.65	3	clay	7.000
26.74	8.2	0.430	17.21	3	clay	8.000
26.90	8.8	0.451	17.50	3	clay	8.000
27.07	8.6	0.420	16.36	3	clay	8.000
27.23	8.7	0.410	16.50	3	clay	8.000
27.40	8.4	0.389	18.07	3	clay	8.000
27.56	8.6	0.379	18.49	3	clay	8.000
27.72	8.9	0.369	19.35	3	clay	8.000
27.89	8.8	0.399	21.34	3	clay	8.000
28.05	8.8	0.389	22.19	3	clay	8.000
28.22	8.7	0.369	21.77	3	clay	8.000
28.38	8.5	0.338	20.77	3	clay	8.000
28.54	8.3	0.338	21.91	3	clay	8.000
28.71	8.5	0.369	24.19	3	clay	8.000
28.87	8.8	0.359	25.18	3	clay	8.000
29.04	8.9	0.399	25.75	3	clay	9.000
29.20	9.7	0.399	29.02	3	clay	9.000
29.36	9.1	0.379	29.88	3	clay	9.000
29.53	8.6	0.389	30.16	3	clay	8.000
29.69	8.5	0.399	28.31	3	clay	8.000
29.86	9.3	0.399	25.89	3	clay	9.000
30.02	9.3	0.379	24.61	3	clay	9.000
30.18	8.6	0.348	23.47	3	clay	9.000
30.35	8.7	0.369	24.04	3	clay	9.000
30.51	9.7	0.399	25.47	3	clay	9.000
30.68	8.9	0.399	24.19	3	clay	9.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
30.84	8.6	0.369	22.48	3	clay	8.000
31.00	8.8	0.369	23.47	3	clay	9.000
31.17	9.2	0.399	23.47	3	clay	9.000
31.33	10.0	0.399	25.04	3	clay	9.000
31.50	10.0	0.399	26.04	3	clay	10.000
31.66	10.9	0.430	27.03	3	clay	10.000
31.82	10.4	0.430	27.74	3	clay	10.000
31.99	9.4	0.399	28.60	3	clay	9.000
32.15	9.6	0.328	29.73	3	clay	9.000
32.32	10.0	0.359	30.87	3	clay	10.000
32.48	10.2	0.348	38.13	3	clay	10.000
32.64	11.3	0.389	40.97	3	clay	11.000
32.81	11.8	0.451	43.39	4	silty clay to clay	8.000
32.97	13.6	0.502	45.95	4	silty clay to clay	9.000
33.14	15.0	0.553	46.95	4	silty clay to clay	9.000
33.30	14.4	0.533	48.51	4	silty clay to clay	9.000
33.46	13.6	0.512	49.79	4	silty clay to clay	9.000
33.63	13.2	0.492	53.21	4	silty clay to clay	9.000
33.79	13.6	0.502	57.19	4	silty clay to clay	9.000
33.96	13.6	0.522	55.91	4	silty clay to clay	9.000
34.12	12.8	0.481	52.07	3	clay	12.000
34.28	11.6	0.440	49.94	3	clay	11.000
34.45	10.5	0.399	50.08	3	clay	10.000
34.61	9.7	0.359	48.37	3	clay	10.000
34.78	9.7	0.359	48.23	3	clay	9.000
34.94	9.8	0.348	44.96	3	clay	9.000
35.10	9.1	0.297	42.68	3	clay	9.000
35.27	8.8	0.277	43.82	4	silty clay to clay	6.000
35.43	8.5	0.246	45.53	4	silty clay to clay	5.000
35.60	8.3	0.236	45.24	4	silty clay to clay	5.000
35.76	8.5	0.236	47.38	4	silty clay to clay	5.000
35.93	8.3	0.225	48.94	4	silty clay to clay	5.000
36.09	8.6	0.236	49.22	4	silty clay to clay	5.000
36.25	8.4	0.215	48.09	4	silty clay to clay	5.000
36.42	8.1	0.143	46.38	4	silty clay to clay	5.000
36.58	7.8	0.195	49.08	4	silty clay to clay	6.000
36.75	10.0	0.369	52.50	3	clay	11.000
36.91	16.1	0.686	18.64	3	clay	12.000
37.07	12.6	0.451	16.65	5	clayey silt to silty clay	8.000
37.24	24.4	0.645	17.21	5	clayey silt to silty clay	8.000
37.40	15.4	0.533	3.84	4	silty clay to clay	10.000
37.57	9.1	0.512	5.55	4	silty clay to clay	8.000
37.73	15.1	0.430	9.53	4	silty clay to clay	10.000
37.89	20.9	0.543	8.96	5	clayey silt to silty clay	10.000
38.06	28.8	0.615	-1.28	6	sandy silt to clayey silt	10.000
38.22	26.8	0.512	-4.98	6	sandy silt to clayey silt	11.000
38.39	28.1	0.666	-6.12	6	sandy silt to clayey silt	11.000
38.55	27.8	0.645	-7.54	6	sandy silt to clayey silt	10.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
38.71	22.1	0.461	-8.25	6	sandy silt to clayey silt	12.000
38.88	44.4	0.604	-7.82	6	sandy silt to clayey silt	11.000
39.04	22.1	0.492	6.83	6	sandy silt to clayey silt	10.000
39.21	11.8	0.440	10.67	5	clayey silt to silty clay	7.000
39.37	11.1	0.184	19.06	5	clayey silt to silty clay	5.000
39.53	10.1	0.154	29.59	5	clayey silt to silty clay	5.000
39.70	8.9	0.123	41.54	5	clayey silt to silty clay	4.000
39.86	8.5	0.123	44.53	5	clayey silt to silty clay	4.000
40.03	7.6	0.113	52.07	5	clayey silt to silty clay	4.000
40.19	8.0	0.143	56.20	5	clayey silt to silty clay	4.000
40.35	8.4	0.154	54.35	5	clayey silt to silty clay	4.000
40.52	8.6	0.174	42.11	4	silty clay to clay	5.000
40.68	8.6	0.184	49.51	4	silty clay to clay	5.000
40.85	8.0	0.205	52.50	4	silty clay to clay	5.000
41.01	8.5	0.205	53.49	4	silty clay to clay	5.000
41.17	8.4	0.195	52.64	4	silty clay to clay	5.000
41.34	7.7	0.164	53.92	4	silty clay to clay	5.000
41.50	7.8	0.154	56.48	4	silty clay to clay	5.000
41.67	7.9	0.143	59.04	5	clayey silt to silty clay	4.000
41.83	8.4	0.143	57.62	5	clayey silt to silty clay	4.000
41.99	8.4	0.133	57.05	5	clayey silt to silty clay	4.000
42.16	8.3	0.143	55.63	5	clayey silt to silty clay	4.000
42.32	8.5	0.164	54.77	5	clayey silt to silty clay	4.000
42.49	8.4	0.143	57.19	5	clayey silt to silty clay	4.000
42.65	8.4	0.143	55.48	5	clayey silt to silty clay	4.000
42.81	8.2	0.133	54.92	5	clayey silt to silty clay	4.000
42.98	8.4	0.113	54.77	5	clayey silt to silty clay	4.000
43.14	8.7	0.082	53.21	5	clayey silt to silty clay	4.000
43.31	8.3	0.082	56.91	5	clayey silt to silty clay	4.000
43.47	7.9	0.082	58.76	5	clayey silt to silty clay	4.000
43.64	7.9	0.092	58.61	5	clayey silt to silty clay	4.000
43.80	8.3	0.154	59.33	5	clayey silt to silty clay	4.000
43.96	10.6	0.174	66.87	5	clayey silt to silty clay	5.000
44.13	14.2	0.225	31.73	5	clayey silt to silty clay	5.000
44.29	9.3	0.277	47.80	5	clayey silt to silty clay	5.000
44.46	9.2	0.225	63.17	4	silty clay to clay	6.000
44.62	8.5	0.215	58.61	4	silty clay to clay	5.000
44.78	7.8	0.225	55.91	4	silty clay to clay	6.000
44.95	11.4	0.277	64.02	4	silty clay to clay	6.000
45.11	10.9	0.420	20.49	4	silty clay to clay	8.000
45.28	16.3	0.594	35.28	4	silty clay to clay	10.000
45.44	18.8	0.563	13.09	4	silty clay to clay	10.000
45.60	13.0	0.451	15.36	4	silty clay to clay	9.000
45.77	12.2	0.318	24.33	4	silty clay to clay	7.000
45.93	10.0	0.256	36.85	4	silty clay to clay	7.000
46.10	9.9	0.215	53.35	4	silty clay to clay	6.000
46.26	9.9	0.215	64.02	5	clayey silt to silty clay	5.000
46.42	10.0	0.195	65.59	5	clayey silt to silty clay	5.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
46.59	9.5	0.225	64.16	4	silty clay to clay	7.000
46.75	11.7	0.348	70.71	5	clayey silt to silty clay	7.000
46.92	20.6	0.379	25.61	5	clayey silt to silty clay	7.000
47.08	11.3	0.369	12.24	5	clayey silt to silty clay	7.000
47.24	10.7	0.174	27.60	5	clayey silt to silty clay	5.000
47.41	11.2	0.174	42.40	5	clayey silt to silty clay	5.000
47.57	12.0	0.164	63.59	5	clayey silt to silty clay	5.000
47.74	11.1	0.154	63.31	5	clayey silt to silty clay	5.000
47.90	11.0	0.154	70.71	5	clayey silt to silty clay	5.000
48.06	11.2	0.184	76.26	5	clayey silt to silty clay	5.000
48.23	12.0	0.307	79.39	5	clayey silt to silty clay	6.000
48.39	17.0	0.604	81.95	4	silty clay to clay	11.000
48.56	24.2	0.963	23.76	4	silty clay to clay	14.000
48.72	26.9	1.004	10.24	5	clayey silt to silty clay	14.000
48.88	35.6	0.922	-0.14	6	sandy silt to clayey silt	14.000
49.05	43.7	0.748	0.71	7	silty sand to sandy silt	14.000
49.21	54.6	0.656	3.13	7	silty sand to sandy silt	16.000
49.38	52.9	0.799	4.84	7	silty sand to sandy silt	15.000
49.54	34.1	1.024	9.39	6	sandy silt to clayey silt	13.000
49.70	18.1	0.645	9.67	5	clayey silt to silty clay	10.000
49.87	11.8	0.318	11.24	5	clayey silt to silty clay	7.000
50.03	11.7	0.236	12.38	5	clayey silt to silty clay	6.000
50.20	12.1	0.225	13.66	5	clayey silt to silty clay	6.000
50.36	11.5	0.236	14.80	5	clayey silt to silty clay	6.000
50.52	12.7	0.236	16.36	5	clayey silt to silty clay	6.000
50.69	12.0	0.205	18.21	5	clayey silt to silty clay	6.000
50.85	11.4	0.266	20.77	5	clayey silt to silty clay	6.000
51.02	13.4	0.328	23.76	5	clayey silt to silty clay	7.000
51.18	18.0	0.328	25.61	5	clayey silt to silty clay	7.000
51.35	11.5	0.348	27.32	5	clayey silt to silty clay	7.000
51.51	12.1	0.348	31.44	4	silty clay to clay	9.000
51.67	16.7	0.502	35.42	5	clayey silt to silty clay	9.000
51.84	29.2	0.615	22.34	6	sandy silt to clayey silt	9.000
52.00	27.3	0.604	9.39	6	sandy silt to clayey silt	9.000
52.17	17.6	0.399	13.66	5	clayey silt to silty clay	9.000
52.33	12.1	0.246	17.64	5	clayey silt to silty clay	7.000
52.49	11.1	0.215	22.62	5	clayey silt to silty clay	5.000
52.66	11.0	0.225	26.04	5	clayey silt to silty clay	5.000
52.82	10.9	0.287	29.02	5	clayey silt to silty clay	6.000
52.99	12.9	0.297	33.29	5	clayey silt to silty clay	6.000
53.15	14.5	0.359	35.14	5	clayey silt to silty clay	6.000
53.31	12.7	0.318	30.02	5	clayey silt to silty clay	6.000
53.48	10.0	0.184	34.86	5	clayey silt to silty clay	5.000
53.64	9.8	0.154	41.68	5	clayey silt to silty clay	5.000
53.81	10.0	0.174	48.23	5	clayey silt to silty clay	5.000
53.97	10.2	0.195	54.63	5	clayey silt to silty clay	5.000
54.13	10.6	0.205	59.89	5	clayey silt to silty clay	5.000
54.30	10.7	0.195	65.02	5	clayey silt to silty clay	5.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
54.46	12.8	0.195	69.00	5	clayey silt to silty clay	6.000
54.63	11.6	0.236	36.42	5	clayey silt to silty clay	6.000
54.79	11.1	0.195	43.25	5	clayey silt to silty clay	5.000
54.95	10.9	0.184	50.36	5	clayey silt to silty clay	5.000
55.12	11.1	0.225	58.61	5	clayey silt to silty clay	6.000
55.28	12.9	0.246	66.01	5	clayey silt to silty clay	7.000
55.45	17.6	0.246	41.40	5	clayey silt to silty clay	7.000
55.61	12.5	0.215	42.68	5	clayey silt to silty clay	7.000
55.77	11.8	0.164	56.91	5	clayey silt to silty clay	6.000
55.94	10.9	0.164	72.41	5	clayey silt to silty clay	6.000
56.10	11.8	0.164	67.29	5	clayey silt to silty clay	5.000
56.27	10.7	0.154	67.15	5	clayey silt to silty clay	5.000
56.43	9.5	0.123	76.11	5	clayey silt to silty clay	5.000
56.59	8.6	0.143	71.42	5	clayey silt to silty clay	4.000
56.76	8.7	0.143	57.33	5	clayey silt to silty clay	4.000
56.92	7.0	0.133	60.18	4	silty clay to clay	5.000
57.09	5.6	0.092	61.32	4	silty clay to clay	4.000
57.25	5.6	0.082	57.48	1	sensitive fine grained	3.000
57.41	5.2	0.072	52.21	1	sensitive fine grained	3.000
57.58	5.5	0.072	48.80	1	sensitive fine grained	3.000
57.74	5.0	0.061	43.53	1	sensitive fine grained	2.000
57.91	4.8	0.051	43.25	1	sensitive fine grained	2.000
58.07	4.7	0.123	41.40	3	clay	6.000
58.23	8.4	0.328	40.97	5	clayey silt to silty clay	5.000
58.40	19.2	0.154	-7.54	4	silty clay to clay	9.000
58.56	17.1	0.983	-7.54	4	silty clay to clay	15.000
58.73	34.3	1.772	-10.39	4	silty clay to clay	26.000
58.89	70.6	2.520	-12.38	5	clayey silt to silty clay	28.000
59.06	71.7	3.175	-12.95	5	clayey silt to silty clay	36.000
59.22	83.2	3.513	-12.66	4	silty clay to clay	47.000
59.38	66.3	3.554	-13.09	11	very stiff fine grained (*)	64.000
59.55	52.5	2.991	-12.80	3	clay	54.000
59.71	49.4	2.612	-12.38	5	clayey silt to silty clay	27.000
59.88	66.6	1.270	-12.52	6	sandy silt to clayey silt	36.000
60.04	165.8	4.876	-12.09	7	silty sand to sandy silt	46.000
60.20	199.9	4.794	-12.80	6	sandy silt to clayey silt	59.000
60.37	99.1	5.941	-12.24	6	sandy silt to clayey silt	55.000
60.53	132.5	4.794	-12.52	11	very stiff fine grained (*)	106.000
60.70	101.3	6.033	-12.38	11	very stiff fine grained (*)	117.000
60.86	133.1	6.453	-12.52	11	very stiff fine grained (*)	119.000
61.02	137.7	6.300	-12.52	12	sand to clayey sand (*)	68.000
61.19	157.6	3.196	-12.66	6	sandy silt to clayey silt	58.000
61.35	155.7	5.542	-12.38	6	sandy silt to clayey silt	54.000
61.52	112.7	6.996	-12.38	11	very stiff fine grained (*)	142.000
61.68	175.5	7.631	-12.38	11	very stiff fine grained (*)	127.000
61.84	109.0	6.699	-12.66	11	very stiff fine grained (*)	119.000
62.01	88.0	4.640	-12.66	11	very stiff fine grained (*)	103.000
62.17	126.1	5.593	-12.24	11	very stiff fine grained (*)	107.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
62.34	122.3	5.583	-8.82	11	very stiff fine grained (*)	117.000
62.50	119.0	5.634	-10.67	11	very stiff fine grained (*)	115.000
62.66	119.9	4.804	-9.82	6	sandy silt to clayey silt	52.000
62.83	166.2	1.055	-10.39	8	sand to silty sand	36.000
62.99	167.4	2.079	-11.81	8	sand to silty sand	44.000
63.16	223.5	4.056	17.36	7	silty sand to sandy silt	55.000
63.32	124.5	4.036	-12.09	7	silty sand to sandy silt	42.000
63.48	51.4	2.960	-11.38	5	clayey silt to silty clay	34.000
63.65	38.5	1.291	-10.67	4	silty clay to clay	27.000
63.81	37.0	1.045	-9.82	5	clayey silt to silty clay	18.000
63.98	35.0	1.024	-9.25	6	sandy silt to clayey silt	14.000
64.14	35.3	0.860	-9.11	6	sandy silt to clayey silt	13.000
64.30	33.7	1.014	-8.68	6	sandy silt to clayey silt	13.000
64.47	35.2	0.850	-7.26	6	sandy silt to clayey silt	13.000
64.63	32.5	0.615	-6.83	6	sandy silt to clayey silt	13.000
64.80	32.6	0.553	-6.83	6	sandy silt to clayey silt	13.000
64.96	37.2	0.778	-6.83	6	sandy silt to clayey silt	15.000
65.12	45.6	1.127	-6.54	6	sandy silt to clayey silt	17.000
65.29	52.6	1.444	-6.40	5	clayey silt to silty clay	24.000
65.45	51.7	2.335	-6.26	5	clayey silt to silty clay	25.000
65.62	53.3	2.530	-6.26	5	clayey silt to silty clay	29.000
65.78	78.2	2.858	-5.98	5	clayey silt to silty clay	32.000
65.94	66.9	1.915	-5.98	6	sandy silt to clayey silt	25.000
66.11	50.4	1.834	-5.55	5	clayey silt to silty clay	27.000
66.27	49.4	1.905	-5.41	5	clayey silt to silty clay	23.000
66.44	44.5	1.823	-5.12	5	clayey silt to silty clay	21.000
66.60	40.0	1.536	-5.55	5	clayey silt to silty clay	19.000
66.77	37.3	1.424	-5.12	5	clayey silt to silty clay	19.000
66.93	38.7	1.362	-5.12	5	clayey silt to silty clay	18.000
67.09	38.4	1.178	-5.12	5	clayey silt to silty clay	19.000
67.26	39.2	1.117	-5.26	6	sandy silt to clayey silt	15.000
67.42	39.4	0.707	-4.84	6	sandy silt to clayey silt	15.000
67.59	38.7	1.219	-4.84	6	sandy silt to clayey silt	16.000
67.75	48.4	1.403	-3.84	5	clayey silt to silty clay	20.000
67.91	37.4	1.219	-3.56	5	clayey silt to silty clay	20.000
68.08	39.1	1.383	-3.27	5	clayey silt to silty clay	20.000
68.24	48.7	1.854	-3.41	5	clayey silt to silty clay	22.000
68.41	50.4	1.721	-2.85	5	clayey silt to silty clay	23.000
68.57	45.5	1.782	-3.13	5	clayey silt to silty clay	24.000
68.73	57.4	1.946	-2.85	5	clayey silt to silty clay	25.000
68.90	56.3	2.714	-2.70	4	silty clay to clay	35.000
69.06	51.0	2.612	-2.42	4	silty clay to clay	32.000
69.23	43.7	2.182	-2.42	4	silty clay to clay	29.000
69.39	42.9	1.496	-2.42	6	sandy silt to clayey silt	21.000
69.55	77.0	1.014	-2.56	7	silty sand to sandy silt	22.000
69.72	87.5	0.410	-3.70	8	sand to silty sand	20.000
69.88	87.6	0.420	-4.27	8	sand to silty sand	21.000
70.05	83.1	0.512	-4.13	8	sand to silty sand	20.000

*Soil behavior type and SPT based on data from UBC-1983

Depth (ft)	Qt (TSF)	Fs (TSF)	Pw (PSI)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
70.21	83.5	0.594	-3.84	8	sand to silty sand	20.000
70.37	82.8	0.768	-3.84	8	sand to silty sand	20.000
70.54	83.1	0.543	-4.13	8	sand to silty sand	20.000
70.70	81.3	0.512	-4.69	8	sand to silty sand	20.000
70.87	81.9	1.045	-4.55	7	silty sand to sandy silt	26.000
71.03	84.7	2.325	-0.85	6	sandy silt to clayey silt	28.000
71.19	54.2	1.967	0.00	5	clayey silt to silty clay	29.000
71.36	42.3	2.018	1.42	5	clayey silt to silty clay	25.000
71.52	57.4	1.803	3.56	5	clayey silt to silty clay	24.000
71.69	49.6	1.547	2.42	5	clayey silt to silty clay	23.000
71.85	36.7	1.393	4.55	5	clayey silt to silty clay	20.000
72.01	40.0	1.680	5.26	5	clayey silt to silty clay	20.000
72.18	46.4	1.188	5.41	6	sandy silt to clayey silt	20.000
72.34	66.9	0.625	0.71	7	silty sand to sandy silt	20.000
72.51	78.2	0.225	0.14	8	sand to silty sand	17.000
72.67	69.6	0.277	-1.71	8	sand to silty sand	17.000
72.83	61.0	0.471	-1.28	7	silty sand to sandy silt	22.000
73.00	75.3	1.731	0.00	7	silty sand to sandy silt	22.000
73.16	70.4	2.172	0.57	6	sandy silt to clayey silt	26.000
73.33	58.5	1.864	0.14	6	sandy silt to clayey silt	27.000
73.49	85.3	2.018	-1.00	6	sandy silt to clayey silt	28.000
73.65	72.8	1.536	-0.85	7	silty sand to sandy silt	26.000
73.82	88.5	1.178	-1.71	7	silty sand to sandy silt	28.000
73.98	102.7	1.864	-2.99	7	silty sand to sandy silt	27.000
74.15	66.3	1.813	-2.56	6	sandy silt to clayey silt	27.000
74.31	44.3	1.844	8.25	5	clayey silt to silty clay	25.000
74.48	46.6	1.844	13.23	5	clayey silt to silty clay	21.000
74.64	41.3	1.670	13.23	6	sandy silt to clayey silt	20.000
74.80	66.2	1.045	14.65	7	silty sand to sandy silt	23.000
74.97	105.4	1.383	2.70	7	silty sand to sandy silt	33.000
75.13	134.9	2.940	2.70	7	silty sand to sandy silt	36.000
75.30	93.9	3.329	-3.27	6	sandy silt to clayey silt	36.000
75.46	55.7	3.042	-3.70	5	clayey silt to silty clay	31.000
75.62	45.3	2.018	-2.70	4	silty clay to clay	29.000
75.79	37.4	1.608	-2.28	4	silty clay to clay	24.000
75.95	31.3	1.301	-2.13	4	silty clay to clay	21.000
76.12	27.7	1.076	-1.99	4	silty clay to clay	19.000
76.28	29.6	1.106	-0.85	5	clayey silt to silty clay	15.000
76.44	34.0	1.178	-0.85	5	clayey silt to silty clay	16.000
76.61	35.1	1.188	-0.43	5	clayey silt to silty clay	17.000
76.77	37.2	1.362	-0.14	5	clayey silt to silty clay	18.000
76.94	41.0	1.536	0.43	5	clayey silt to silty clay	20.000
77.10	46.6	1.926	1.00	4	silty clay to clay	27.000
77.26	38.0	2.018	1.99	0	<out of range>	0.000
77.43	35.0	-32768	2.56	0	<out of range>	0.000
77.59	30.3	-32768	4.98	0	<out of range>	0.000

Appendix C
Important Information about this Geotechnical Report

Important Information About Your Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. *No one except you* should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one—not even you*—should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, *do not rely on a geotechnical engineering report* that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions *only* at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an *opinion* about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject To Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce such risks, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations", many of these provisions indicate where geotechnical engineers responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Rely on Your Geotechnical Engineer for Additional Assistance

Membership in ASFE exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

ASFE

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email: info@asfe.org www.asfe.org

IIGER1000.10M

SUBMITTAL REGISTER																	CONTRACT NO.
TITLE AND LOCATION RIO GRANDE DE ARECIBO, CONTRACT 1 (Rev Am 0004)						CONTRACTOR											
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		01270	SD-01 Preconstruction Submittals														
			Schedule of Values		G COR												
		01310	SD-01 Preconstruction Submittals														
			List of Subcontractors														
			Signature Authority														
			Drug-Free Work Place Record														
		01312	SD-01 Preconstruction Submittals														
			First QCS Export		G COR												
		01321	SD-01 Preconstruction Submittals														
			Construction Schedule	1.2	G COR												
		01330	SD-01 Preconstruction Submittals														
			Export File		G COR												
		01355	SD-01 Preconstruction Submittals														
			Environmental Protection Plan		G PD												
			SD-07 Certificates														
			Bird Nesting Monitoring		G PD												
			Qualifications														
			Puerto Rico Boa Monitoring		G PD												
			Qualifications														
			SD-11 Closeout Submittals														
			Project Environmental Summary														
			Sheet														
			Logs/Summary of Bird Nesting														
			Monitoring														
		01451	SD-01 Preconstruction Submittals														
			Laboratory Qualifications		G COR												

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		01451	Contractor Quality Control (CQC)		G COR												
			Plan														
			Letter of Authority														
		01452A	SD-07 Certificates														
			Special Inspector	1.3	G												
			Quality Assurance Plan	1.4	G												
		01500	SD-01 Preconstruction Submittals														
			Mobilization/Demobilization Plan														
			Security Plan														
			SD-02 Shop Drawings														
			Site Layout														
			Trailer Floor Plan														
			Temporary Electric Drawings														
			Construction Drawings		G COR												
		01525	SD-01 Preconstruction Submittals														
			Accident Prevention Plan (APP)	1.6	G COR												
			Activity Hazard Analyses (AHA)	1.7	G COR												
			Employee Safety and Health														
			Indoctrination (ESHI) and Training														
			Plan														
			Hazard Communication Plan	1.9													
			Emergency Response Plan	1.11													
			Hurricane and Severe Storm Plan	1.10	G COR												
			Dive Operations Plan		G COR												
			Critical Lift Plan		G COR												
			Confined Space Plan	1.14	G COR												

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		01525	Spill Response Plan		G COR												
			Blasting Safety Plan		G COR												
			SD-04 Samples														
			Sample Scaffold														
			SD-07 Certificates														
			Safety Officer Qualifications	1.16.1	G COR												
			Dredge Plant Inspection		G COR												
			Checklists														
			Crane Equipment	1.21.5													
		01550	SD-01 Preconstruction Submittals														
			Traffic Control Plan		G COR												
		01780	SD-02 Shop Drawings														
			As-Built Drawings	1.2.1	G COR												
		02201	SD-01 Preconstruction Submittals														
			Work Plan		G												
		02220	SD-03 Product Data														
			Work Plan		G COR												
			SD-07 Certificates														
			Demolition plan		G												
			Notifications	1.4.1	G												
			Notification of Demolition and		G												
			Renovation forms														
			SD-11 Closeout Submittals														
			Receipts														
		02316a	SD-06 Test Reports														
			Field Density Tests	3.4.3	G COR												

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		02316a	Testing of Backfill Materials	3.4.2	G	COR												
		02331a	SD-03 Product Data															
			Shoring, Sheeting, and Bracing	3.5	G	ED												
			Excavation	3.7	G	ED												
			Borrow Areas	3.7.6	G	COR												
			Plan of Operations		G	ED												
			Nuclear Density		G	COR												
		02371a	SD-04 Samples															
			Stone Fill	2.1.5	G	COR												
			SD-07 Certificates															
			Stone Fill	2.1.5	G	EGS												
			Gabion Wire Material		G	EGS												
		02378a	SD-04 Samples															
			Geotextile	2.1.1	G	COR												
			SD-07 Certificates															
			Geotextile	2.1.1	G	ED												
		02441N	SD-01 Preconstruction Submittals															
			Microtunneling Boring Machine	3.2.3														
			SD-03 Product Data															
			Piping	2.1														
			Bentonite	2.3														
			SD-05 Design Data															
			Design calculations of pipe															
			Method of spoil removal															
			Anticipated jacking loads															

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		02441N	Method(s) of controlling														
			groundwater														
			Shaft Information														
			SD-07 Certificates														
			Piping	2.1													
			linings														
			SD-08 Manufacturer’s Instructions														
			Installation	3.2													
		02457N	SD-02 Shop Drawings														
			Steel sheet piles	2.1													
			SD-07 Certificates														
			Pile pulling method	3.3.2													
			Material certificates	1.5.1													
			Pile driving hammer and														
			equipment														
			SD-11 Closeout Submittals														
			Pile driving record	3.4													
		02465	SD-01 Preconstruction Submittals														
			Jet-grouting subcontractor		G EGS												
			Jet-grouting design engineer		G EGS												
			Jet-grouting site superintendent		G EGS												
			Jet-Grout Wall Core Borings		G EGS												
			Jet-Grout Wall Design		G EGS												
			Grout mix design		G EGS												
			Work plan		G EGS												
			Quality control plan		G EGS												

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		02465	SD-06 Test Reports														
			Daily Reports														
		02510A	SD-01 Preconstruction Submittals														
			Detailed Drawings		G ED												
			SD-03 Product Data														
			Installation	3.1	G ED												
			Satisfactory Installation		G ED												
			SD-07 Certificates														
			Manufacturer's Representative	1.4	G ED												
			Installation	3.1	G ED												
			Meters	2.9.8	G ED												
		02630	SD-03 Product Data														
			Placing Pipe		G												
			SD-04 Samples														
			Pipe for Culverts and Storm	2.1	G												
			Drains														
			SD-07 Certificates														
			Resin Certification														
			Pipeline Testing	3.5													
			Hydrostatic Test on Watertight	2.4													
			Joints														
			Determination of Density														
		02632	SD-03 Product Data														
			Corrugated Aluminum Alloy Pipe	2.1													
			Fittings	1.3.1													
			Joints	2.2													

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		02632	Placing Pipe	3.3													
		03101a	SD-02 Shop Drawings														
			Shop Drawings	1.4													
			SD-03 Product Data														
			Materials	2.1													
			SD-04 Samples														
			Sample Panels	1.5													
			SD-06 Test Reports														
			Inspection	3.3													
			Formwork Not Supporting Weight	3.2.1													
			of Concrete														
		03151a	SD-03 Product Data														
			Splicing Waterstops	2.2.2													
			SD-04 Samples														
			Field Molded Sealants and Primer	2.1.2.1													
			Waterstops	2.1.3													
		03200a	SD-02 Shop Drawings														
			Reinforcement	3.1	G												
			SD-07 Certificates														
			Reinforcing Steel	2.2													
		03301a	SD-03 Product Data														
			Concrete Mixture Proportioning	2.2	G												
			Batch Plant	3.1.1	G COR												
			Concrete Mixers	3.1.2													
			Capacity														
			Conveying Equipment	3.1.3													

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		03301a	Placing Equipment															
			Tests and Inspections	3.6														
			Testing Technicians	3.6.1														
			Concrete Transportation	3.6.1														
			Construction Inspector (CTCI)															
			Construction Joint Treatment	3.2.3														
			Curing and Protection	3.5														
			Cold-Weather Placing	3.3.4														
			Hot-Weather Placing	3.3.5														
			Finishing	3.4														
			SD-04 Samples															
			Aggregates	1.3.1.1	G													
			Cementitious Materials,	1.3.1.2	G													
			Admixtures, and Curing Compound															
			SD-06 Test Reports															
			Quality of Aggregates	3.6.2.3														
			Mixer Uniformity	3.6.2.13														
			Tests and Inspections	3.6	G	COR												
			SD-07 Certificates															
			Cementitious Materials	2.1.1														
			Impervious-Sheet Curing	2.1.4.1														
			Materials															
			Air-Entraining Admixture	2.1.3.1														
			Other Chemical Admixtures	2.1.3.4														
			Membrane-Forming Curing	2.1.4.2														
			Compound															

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		03301a	Epoxy Resin	2.1.8	G													
			Latex Bonding Compound	2.1.7														
			Nonshrink Grout	2.1.6														
		05505	SD-02 Shop Drawings															
			Drawings		G	ED												
			SD-03 Product Data															
			Warranty		G	ED												
		09965A	SD-03 Product Data															
			Safety and Health Provisions	1.5	G													
			SO															
			Confined Spaces	1.5.6.1	G													
			Respirators	1.5.7.2	G													
			Certified Laboratory	1.3.2	G													
			Ventilation	1.5.6.1	G													
			Medical Status	1.6	G													
			Lead-Based Paint Removal	1.6	G													
			Environmental Protection	1.8	G													
			Waste Classification, Handling,	1.8.1	G													
			and Disposal															
			Containment	1.8.2	G													
			Visible Emissions Monitoring	1.8.3	G													
			PM-10 Monitoring		G													
			Water Quality	1.8.4	G													
			COR															
			Soil Quality	1.8.5	G													
			SD-04 Samples															

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		09965A	Special Paint Formulas	2.1	G												
			COR														
			Paint Formulations	2.2	G												
			Solvent and Thinners	2.3.3	G												
			SD-06 Test Reports														
			PM-10 Monitoring		G												
			COR														
			TSP Monitoring		G												
			Certified Laboratory	1.3.2	G												
			Soil Quality	1.8.5	G												
			Inspection	3.4	G												
			SD-07 Certificates														
			Qualifications	1.3	G												
			COR														
			Qualified Painting Contractor	1.3.3	G												
			Qualified Hazardous Paint Removal Contractor	1.3.4	G												
			Coating Thickness Gage Qualification	1.3.6	G												
		16000	SD-01 Preconstruction Submittals														
			Detail Drawings														
			Powerline, Cable TV, and Telephone Plans														

SECTION 02465

REINFORCED JET GROUTING

PART 1 GENERAL

1.1 SUMMARY

This section is a performance type specification. The Contractor shall be responsible to design the jet-grout mix parameters and the layout and geometry of the treatment zones. The Government's design is based on the core boring and cone data provided. The Contractor's design may vary from the Government's including the upper and lower elevation of the treatment zones shown in the drawings if the Contractor's core borings indicate that such variations of the upper and lower elevations of the treatment zones are warranted. The Contractor shall also be responsible to construct the jet-grout columns. This section includes materials, equipment, and procedures for the installation of soil-cement columns by the single or double fluid jet grouting method. The triple fluid method of jet grouting is not allowed on this project.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN PETROLEUM INSTITUTE (API)

API RP 13B-1	(1997; A 2000) Standard Procedure for Field Testing Water-Based Drilling Fluids

ASTM INTERNATIONAL (ASTM)

ASTM C 39/C 39M	(2003) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 150	(2002ae1) Portland Cement

1.3 DEFINITIONS

1.3.1 Jet Grouting

Jet grouting is a technique utilizing a special drill bit and injection monitor with radial horizontal nozzles. This process produces soil-cement columns by pumping neat cement grout slurry through horizontal jets which cuts and mixes in situ with the surrounding materials as the drill bit is slowly rotated and withdrawn. The single fluid method of jet grouting will be performed for the test.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Jet-grouting subcontractor; G|EGS

Within 10 days after award, submit subcontractor for jet grouting. This submittal shall include a list of at least 15 projects of similar scope and magnitude with the specified jet-grout injection system that the subcontractor completed and a list of sufficient competent experienced personnel to carry out the operations specified.

Jet-grouting design engineer; G|EGS

Within 10 days after award, submit an experienced design engineer and a list of at least 10 projects that he or she designed and oversaw during construction. The design engineer must be a registered Professional Engineer in his or her state of practice.

Jet-grouting site superintendent; G|EGS

Within 10 days of award, submit a project superintendent with jet-grouting experience and a list of at least 10 projects of similar scope and magnitude that he supervised in the field.

Jet-Grout Wall Core Borings; G|EGS

Within 20 days of approval of the Jet-Grout Design Engineer, Submit one core boring for each of the two jet-grout walls. The core boring shall be deep enough to provide adequate design data.

Jet-Grout Wall Design G|EGS

Within 20 days of delivery of the core borings, submit a design for each soil-cement wall with drawings and calculations. The calculations shall demonstrate that the soil-cement walls are designed for structural integrity and wall stability for all failure modes and loadings including earth pressures from the highway embankment beyond the active wedge. The stability analysis shall be done in accordance with EM 1110-2-1902, referenced above. The cases the wall shall be designed for are End-of-Construction, Long Term and Earthquake using a minimum earthquake acceleration of 0.15 g's. This submittal shall be for the COR's approval.

Grout mix design; G|EGS

Within 20 days of delivery of the jet-grout core borings, submit grout mix design, sources of mix materials, and material data demonstrating compliance with requirements herein. The grout mix design shall be based on laboratory tests on samples retrieved from a core boring performed by the Contractor for each jet-grout wall and mixed with the proposed quantities and cement type to be used in construction. The suitability of the proposed grout mix design shall be verified by laboratory unconfined compression tests for each material type encountered in the Contractor's core boring.

Work plan; G|EGS

Within 10 days after approval of the jet-grout wall design, submit working drawings, method descriptions, including but not limited to catalog drawings and details that show the proposed equipment and tooling plant, equipment and material descriptions, arrangement of grout mixing and injection equipment, location of grout columns, sequence of jet-grout column installation, and other necessary details and calculations.

Quality control plan; G|EGS

Within 10 days after approval of the jet-grout wall design by the COR, submit layout and procedures for test program to establish optimum jet-grouting parameters.

SD-06 Test Reports

Daily Reports

Submit daily reports during the performance of test and production jet grouting providing the information listed below. A sample of the report form proposed for use by the Contractor shall be submitted to the Engineer for approval prior to the start of work.

a. Jet-Grout column or Steel Casing number.

b. Time and date of beginning and completion of each grout column.

c. Grout mix data, including mix proportions and specific gravity measurements.

d. Grout pumping pressures used to construct each grout column.

e. Grout flow rates for each grout column.

f. Rates of rotation and withdrawal of jet rods for each grout column.

g. Total grout quantity used for each column.

h. Grout-take verses depth for each column.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Cement

Portland Cement, ASTM C 150, Type I or Type II.

2.1.2 Water

Clean, potable, and free from all organic materials, strong acids, or alkalis. Water source shall be tested in accordance with API RP 13B-1.

2.1.3 Admixtures

Other materials and/or admixtures may be used in the mix, provided they are shown necessary in order to satisfy strength, permeability, or other technical requirements and are approved by the Contracting Officer's Representative (COR).

2.1.4 Grout Mix

The grout mix utilized shall be as required to provide the completion of the jet-grouted columns as defined by these specifications, and as verified by test of the cement grout program results. The specific gravity shall be not less than 1.6. The Unconfined Compressive Strength of the grout mix shall be not less than 1915 KPa (40,000 psf). The minimum diameter of the grouted columns shall be no less than 1.219 m (4 feet).

2.2 EQUIPMENT

Spare parts and/or equipment shall be available on site to maintain jet-grouting equipment in satisfactory operating conditions at all times during execution of the jet-grouting work.

2.2.1 Drilling Equipment

The drilling equipment provided by the Contractor shall be of a type and capacity suitable for advancing the steel casing and jet rods to the depth required. Automated controls shall be provided for rotation and withdraw rates of the jet rods as determined for the formation of the jet-grouted column.

2.2.2 Grouting Equipment

2.2.2.1 Mixers

Grout mixers, holding tanks, and associated equipment shall be of a type and capacity for continuously producing a uniform grout mixture at the times, and in the quantities, required for timely prosecution of the work. Grout mixers shall be colloidal type. Paddle type mixers are not allowed

2.2.2.2 Jet-Grouting Pumps

Use high pressure pumps capable of delivering grout at the flow rates and pressures required for the performance of the work in accordance with these specifications. However, pumps shall be capable of pumping the cement grout at a pressure adequate to obtain the required diameter and strength soil-mix column in the In-Situ soils at this site.

PART 3 EXECUTION

3.1 DESIGN

The reinforced soil-cement column layout and column design shall be reviewed and approved by a registered engineer under direct contract with the Jet-Grouting Contractor. This engineer shall be experienced in the design and construction of reinforced jet-grout columns.

3.2 INSTALLATION

3.2.1 Instrumentation

Prior to jet grouting, the Contractor shall install heave/settlement instrumentation as shown on the instrumentation plan. The Contractor shall be responsible for verifying all underground interference shown on the drawings.

3.2.2 Reinforcement

Reinforcement shall be installed, grouted, and cured a minimum of 8 hours prior to the installation of adjacent jet-grout columns.

3.2.3 Drill Holes

Drill holes shall be advanced at the locations and to the design depth as shown on the jet-grout Contractor's design drawings. Any field modifications must be approved by the COR.

3.2.4 Jet Rods

An appropriate device shall be seated at the end of the jet rods to initiate lateral flow through jet nozzles located on the sides of the jet rods.

3.2.5 Testing

Subject to the results of the test program (see paragraph TEST PROGRAM below), the COR may require modifications in the jet-grout column production to achieve satisfactory results. Depending on the extent of modifications necessary, the Contractor may be required to repeat the construction of a test section.

3.2.6 Spoil Disposal

Grout, soil, and water spoil return shall be contained and disposed of in accordance with federal, state and local laws and regulations.

3.2.7 Drilling and Grouting Sequence

The drilling and grouting sequence shall be such that an adequate distance is left between the freshly installed columns and any previously installed adjacent or nearby columns. A minimum set time of eight hours shall be provided before installing adjacent columns.

3.3 TEST PROGRAM

Prior to production work, a test program shall be conducted by the Contractor in accordance with the accepted work plan. The test program shall be used to optimize the various parameters including grout mix, grout pressures, rotational speed, lifting rate, grout flow rate, number and size of grout jet nozzles, and drilling methods. The test program and its results will be observed and reviewed by the COR. The test program shall be installed in areas near the planned production work and in soils similar to that anticipated to be found during production work. The test program shall be executed in accordance with the procedures submitted and accepted by the COR.

3.3.1 Test Program Scope

The test program shall consist of constructing a minimum of two jet grouted columns installed between the same elevations specified for the production jet-grouting work. After a minimum of 7 days set time the columns shall be core drilled and selected samples shall be sent to a lab for unconfined compression testing.

3.3.2 Core Drilling

The core drilling of each jet-grouted test column shall be performed using a 76 mm (3-inch) diamond tipped core barrel, in order to obtain continuous sampling the full length of the column. The core drill run shall be performed along a vertical line 75 mm (3 in) inside of the outer design diameter of the jet-grouted test column. (i.e. For a 4-foot outer design diameter the core drill run center line shall be located 3-in from the outside design diameter or 21-in from the center line of the soil-cement cylinder.)

3.3.3 Unconfined Compressive Strength Test

A laboratory Unconfined Compressive Strength test in accordance with ASTM C 39/C 39M shall be performed on a minimum of one (1) 76 mm (3-inch) nominal diameter by 229 mm (9-inch) long core sample for each 3.048 m (10 ft) of jet-grouted test column.

3.3.4 Production Modifications

Subject to the results of the test program, the COR may require modifications in the jet-grout column production to achieve satisfactory results. Depending on the extent of modifications necessary, the Contractor may be required to repeat the construction of a test jet-grout column.

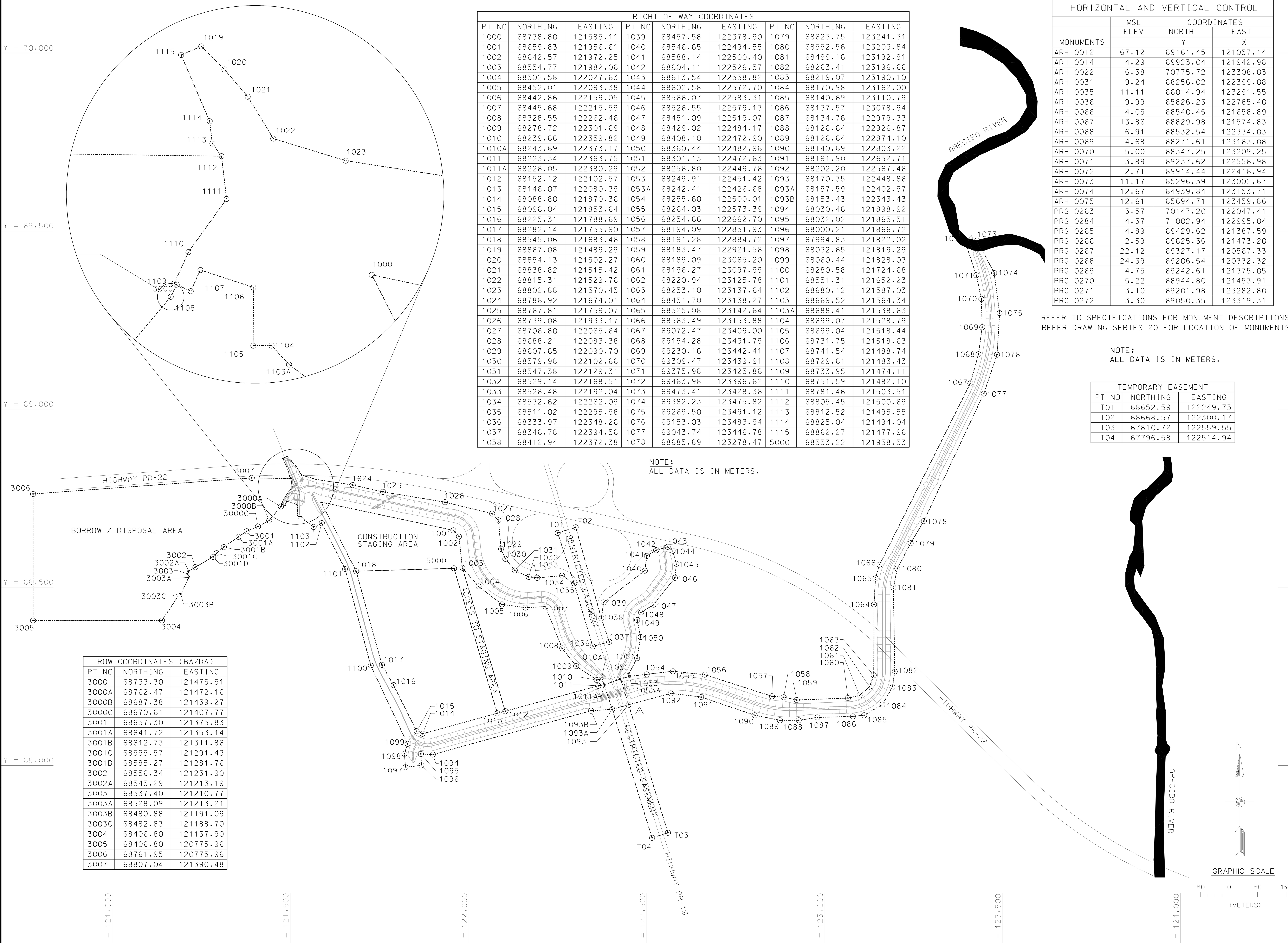
3.4 PRODUCTION

The Contractor shall use the same equipment, materials, and procedures as those determined in the test program to perform production jet-grouting work as described herein.

3.5 QUALITY CONTROL

Uniformity of grout mixture shall be measured by the Contractor by taking unit weight (density) measurements of the mixed grout by mud balance, taken at the mix plant. Frequency shall be at least one measurement per 2,000 gallons of grout mixed and pumped, or daily whichever is more stringent. Appropriate records shall be kept by the Contractor and submitted to the COR to verify that grout mixture(s) are as accepted. Continuous recording of jet-grouting parameters shall be provided in the daily reports for each production column to verify consistency with the approved test program results.

-- End of Section --



RIGHT OF WAY COORDINATES								
PT NO	NORTHING	EASTING	PT NO	NORTHING	EASTING	PT NO	NORTHING	EASTING
1000	68738.80	121585.11	1039	68457.58	122378.90	1079	68623.75	123241.31
1001	68659.83	121956.61	1040	68546.65	122494.55	1080	68552.56	123203.84
1002	68642.57	121972.25	1041	68588.14	122500.40	1081	68499.16	123192.91
1003	68554.77	121982.06	1042	68604.11	122526.57	1082	68263.41	123196.66
1004	68502.58	122027.63	1043	68613.54	122558.82	1083	68219.07	123190.10
1005	68452.01	122093.38	1044	68602.58	122572.70	1084	68170.98	123162.00
1006	68442.86	122159.05	1045	68566.07	122583.31	1085	68140.69	123110.79
1007	68445.68	122215.59	1046	68526.55	122579.13	1086	68137.57	123078.94
1008	68328.55	122262.46	1047	68451.09	122519.07	1087	68134.76	122979.33
1009	68278.72	122301.69	1048	68429.02	122484.17	1088	68126.64	122926.87
1010	68239.66	122359.82	1049	68408.10	122472.90	1089	68126.64	122874.10
1010A	68243.69	122373.17	1050	68360.44	122482.96	1090	68140.69	122803.22
1011	68223.34	122363.75	1051	68301.13	122472.63	1091	68191.90	122652.71
1011A	68226.05	122380.29	1052	68256.80	122449.76	1092	68202.20	122567.46
1012	68152.12	122102.57	1053	68249.91	122451.42	1093	68170.35	122448.86
1013	68146.07	122080.39	1053A	68242.41	122426.68	1093A	68157.59	122402.97
1014	68088.80	121870.36	1054	68255.60	122500.01	1093B	68153.43	122343.43
1015	68096.04	121853.64	1055	68264.03	122573.39	1094	68030.46	121898.92
1016	68225.31	121788.69	1056	68254.66	122662.70	1095	68032.02	121865.51
1017	68282.14	121755.90	1057	68194.09	122851.93	1096	68000.21	121866.72
1018	68545.06	121683.46	1058	68191.28	122884.72	1097	67994.83	121822.02
1019	68867.08	121489.29	1059	68183.47	122921.56	1098	68032.65	121819.29
1020	68854.13	121502.27	1060	68189.09	123065.20	1099	68060.44	121828.03
1021	68838.82	121515.42	1061	68196.27	123097.99	1100	68280.58	121724.68
1022	68815.31	121529.76	1062	68220.94	123125.78	1101	68551.31	121652.23
1023	68802.88	121570.45	1063	68253.10	123137.64	1102	68680.12	121587.03
1024	68786.92	121674.01	1064	68451.70	123138.27	1103	68669.52	121564.34
1025	68767.81	121759.07	1065	68525.08	123142.64	1103A	68688.41	121538.63
1026	68739.08	121933.17	1066	68563.49	123153.88	1104	68699.07	121528.79
1027	68706.80	122065.64	1067	69072.47	123409.00	1105	68699.04	121518.44
1028	68688.21	122083.38	1068	69154.28	123431.79	1106	68731.75	121518.63
1029	68607.65	122090.70	1069	69230.16	123442.41	1107	68741.54	121488.74
1030	68579.98	122102.66	1070	69309.47	123439.91	1108	68729.61	121483.43
1031	68547.38	122129.31	1071	69375.98	123425.86	1109	68733.95	121474.11
1032	68529.14	122168.51	1072	69463.98	123396.62	1110	68751.59	121482.10
1033	68526.48	122192.04	1073	69473.41	123428.36	1111	68781.46	121503.51
1034	68532.62	122262.09	1074	69382.23	123475.82	1112	68805.45	121500.69
1035	68511.02	122295.98	1075	69269.50	123491.12	1113	68812.52	121495.55
1036	68333.97	122348.26	1076	69153.03	123483.94	1114	68825.04	121494.04
1037	68346.78	122394.56	1077	69043.74	123446.78	1115	68862.27	121477.96
1038	68412.94	122372.38	1078	68685.89	123278.47	5000	68553.22	121958.53

NOTE:
ALL DATA IS IN METERS.

HORIZONTAL AND VERTICAL CONTROL			
	MSL	COORDINATES	
	ELEV	NORTH	EAST
MONUMENTS		Y	X
ARH 0012	67.12	69161.45	121057.14
ARH 0014	4.29	69923.04	121942.98
ARH 0022	6.38	70775.72	123308.03
ARH 0031	9.24	68256.02	122399.08
ARH 0035	11.11	66014.94	123291.55
ARH 0036	9.99	65826.23	122785.40
ARH 0066	4.05	68540.45	121658.89
ARH 0067	13.86	68829.98	121574.83
ARH 0068	6.91	68532.54	122334.03
ARH 0069	4.68	68271.61	123163.08
ARH 0070	5.00	68347.25	123209.25
ARH 0071	3.89	69237.62	122556.98
ARH 0072	2.71	69914.44	122416.94
ARH 0073	11.17	65296.39	123002.67
ARH 0074	12.67	64939.84	123153.71
ARH 0075	12.61	65694.71	123459.86
PRG 0263	3.57	70147.20	122047.41
PRG 0284	4.37	71002.94	122995.04
PRG 0265	4.89	69429.62	121387.59
PRG 0266	2.59	69625.36	121473.20
PRG 0267	22.12	69327.17	120567.33
PRG 0268	24.39	69206.54	120332.32
PRG 0269	4.75	69242.61	121375.05
PRG 0270	5.22	68944.80	121453.91
PRG 0271	3.10	69201.98	123282.80
PRG 0272	3.30	69050.35	123319.31

REFER TO SPECIFICATIONS FOR MONUMENT DESCRIPTIONS.
REFER DRAWING SERIES 20 FOR LOCATION OF MONUMENTS.

NOTE:
ALL DATA IS IN METERS.

TEMPORARY EASEMENT		
PT NO	NORTHING	EASTING
T01	68652.59	122249.73
T02	68668.57	122300.17
T03	67810.72	122559.55
T04	67796.58	122514.94

ROW COORDINATES (BA/DA)		
PT NO	NORTHING	EASTING
3000	68733.30	121475.51
3000A	68762.47	121472.16
3000B	68687.38	121439.27
3000C	68670.61	121407.77
3001	68657.30	121375.83
3001A	68641.72	121353.14
3001B	68612.73	121311.86
3001C	68595.57	121291.43
3001D	68585.27	121281.76
3002	68556.34	121231.90
3002A	68545.29	121213.19
3003	68537.40	121210.77
3003A	68528.09	121213.21
3003B	68480.88	121191.09
3003C	68482.83	121188.70
3004	68406.80	121137.90
3005	68406.80	120775.96
3006	68761.95	120775.96
3007	68807.04	121390.48

US Army Corps of Engineers
Jacksonville District

SAFETY ON THIS JOB DEPENDS ON YOU

No.	Symbol	Zone	Description	Approved
1	A	E2	REVISED TO ACCOMPANY AMENDMENT NO. 0004	

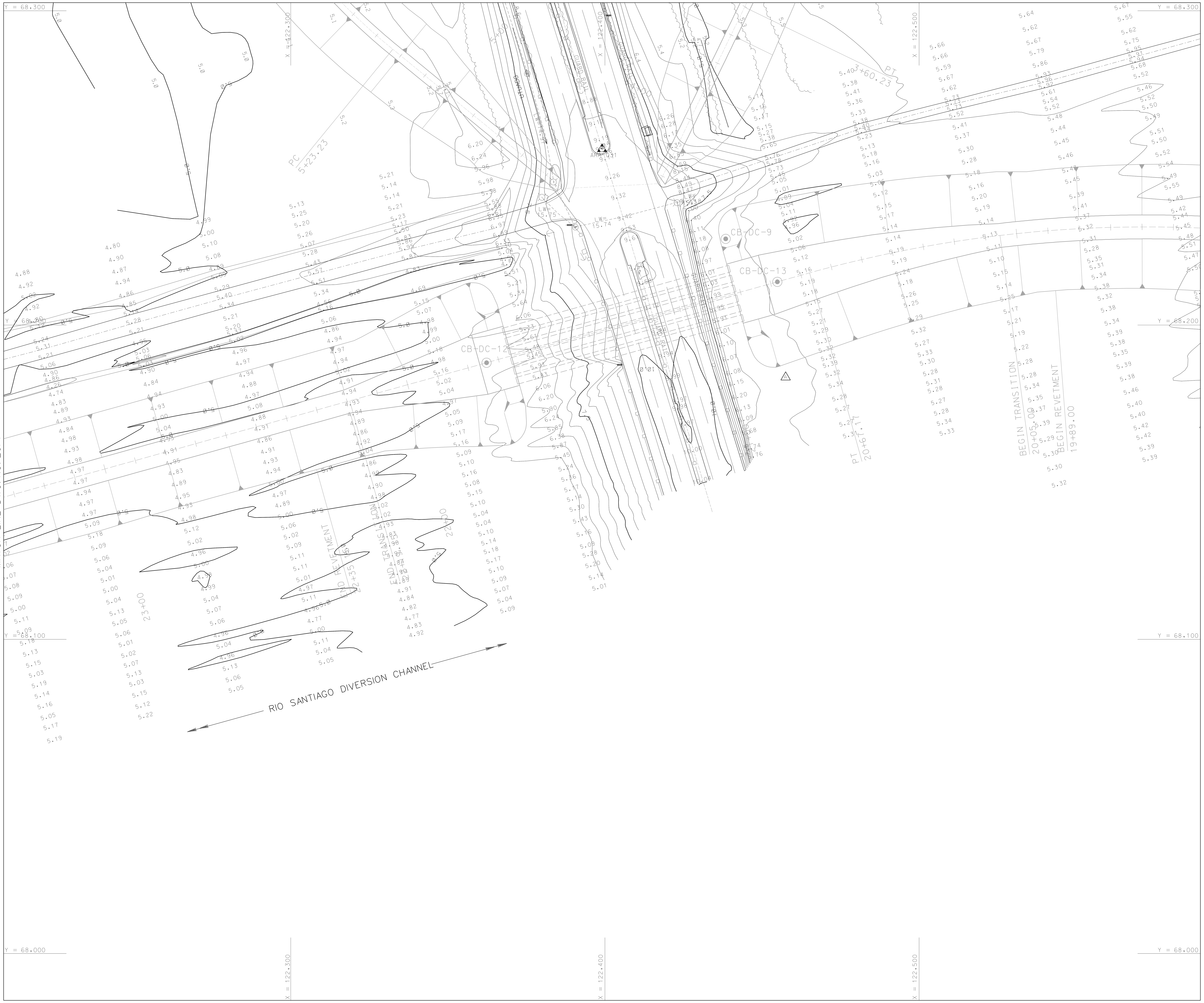
DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

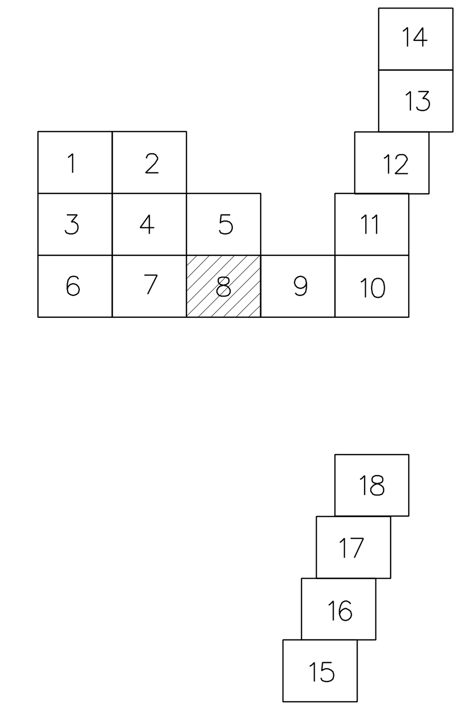
Designed by: D.L.N.
Dwn by: D.L.N.
Ckd by: ?.?.?.
Inv. No. W912EP-04-B-0010
Scale: AS SHOWN
Dated: MAY 2003
D.O.FILE NO. 106-38,385

File name: AREC1003.DGN
Reference files: ARECBRDR.DGN ARECROW.DGN ARECSITE.DGN

RIO GRANDE DE ARECIBO
ARECIBO, PUERTO RICO
FLOOD CONTROL PROJECT
RIO GRANDE DE ARECIBO
CONTRACT 1
GENERAL
RIGHT OF WAY AND CONTROL PLAN
ARECIBO

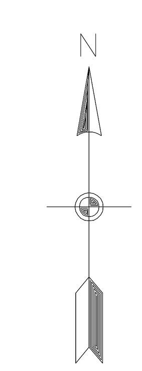
DRAWING NO.
10/3





SHEET INDEX

NOTE:
REFER TO DRAWING NO. 20/1 FOR SURVEY NOTES AND LEGEND.



GRAPHIC SCALE

10M 0 10M 20M

US Army Corps of Engineers
Jacksonville District

SAFETY ON THIS JOB DEPENDS ON YOU

No.	Symbol	Zone	Description	Approved
1	A	E4	REVISED TO ACCOMPANY AMENDMENT NO. 0004	

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

Designed by: D.N.
Dwn by: R.L.H.
Ckd by:
Inv. No. W912EP-04-B-0010
Scale:
Dated: MAY 2003
D.O.FILE NO. 106-38,385

File name: AREC2008.DGN
Reference files:
ARECBRDR.DGN
ARECSITE.DGN
B137-CTL.DGN
B137-DTM.DGN
B137-ELE.DGN
B137-PLN.DGN
C110BRDG.DGN
C110CON.DGN
C110CUL.DGN
C110ELE.DGN
C110PLN.DGN
C110ROAD.DGN

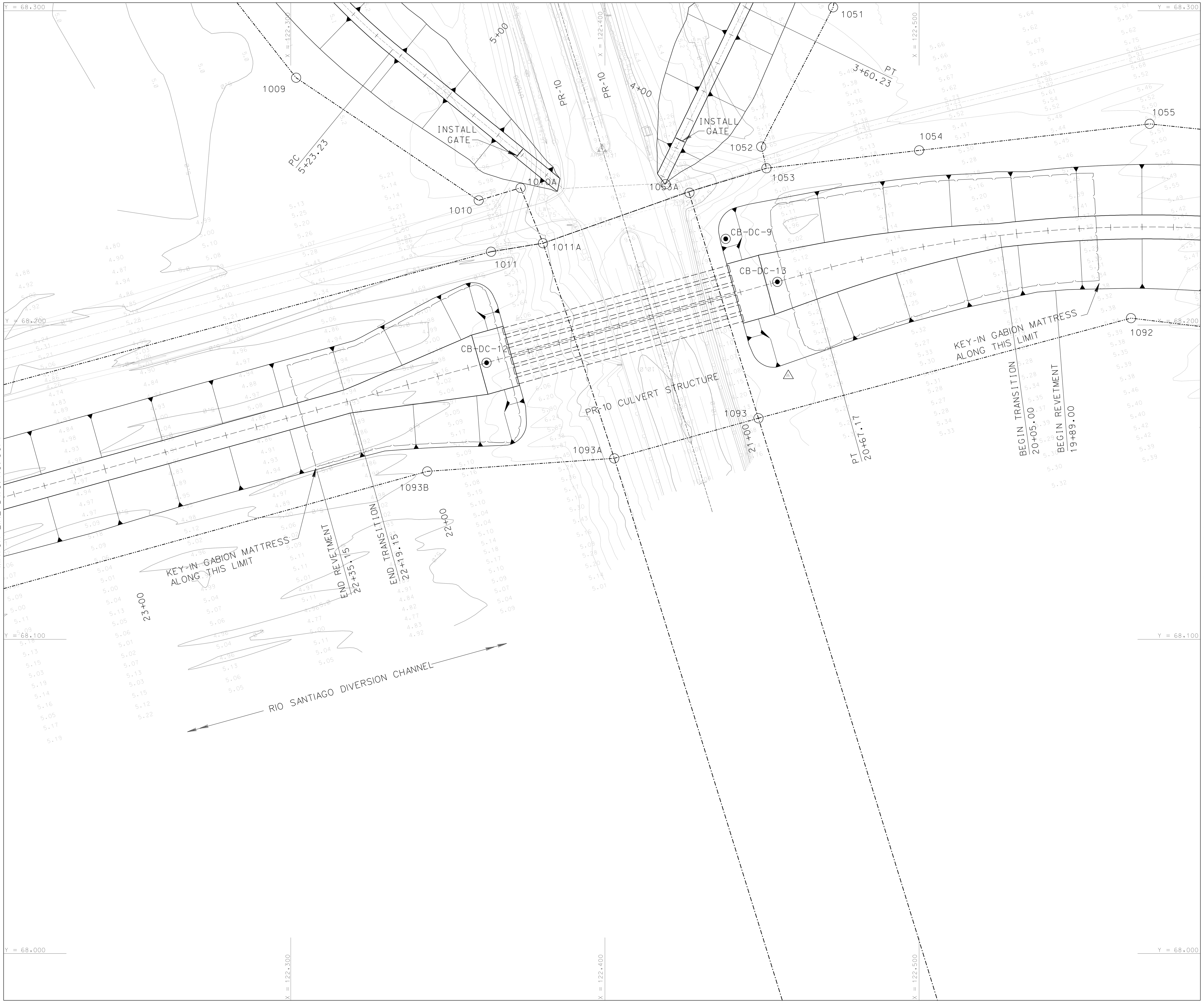
RIO GRANDE DE ARECIBO
ARECIBO, PUERTO RICO
FLOOD CONTROL PROJECT
RIO GRANDE DE ARECIBO
CONTRACT 1
TOPOGRAPHIC SURVEY

SITE PLANS

DRAWING NO.
20/8

.../dms00278/arec2008.dgn 09/09/2004 07:41:15 AM

MATCH LINE DWG. NO. 30/5



MATCH LINE DWG. NO. 30/7

MATCH LINE DWG. NO. 30/9

SHEET INDEX

NOTES:

1. SEE DRAWING NO. 30/1 FOR LEGEND AND GENERAL NOTES.
2. REFER TO DRAWING SERIES 50 FOR PR-10 CULVERT STRUCTURE PLAN AND DETAILS.

N

GRAPHIC SCALE

10M 0 10M 20M

US Army Corps of Engineers
Jacksonville District

SAFETY ON THIS JOB DEPENDS ON YOU

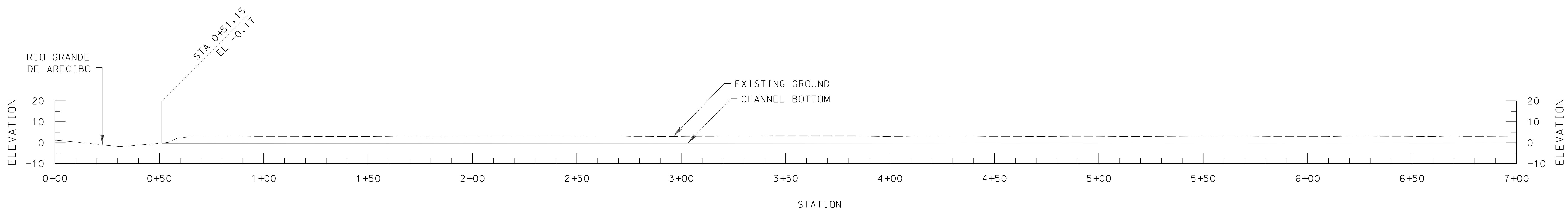
No.	Symbol	Zone	Description	Approved
1	△	E4	REVISED TO ACCOMPANY AMENDMENT NO. 0004	

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

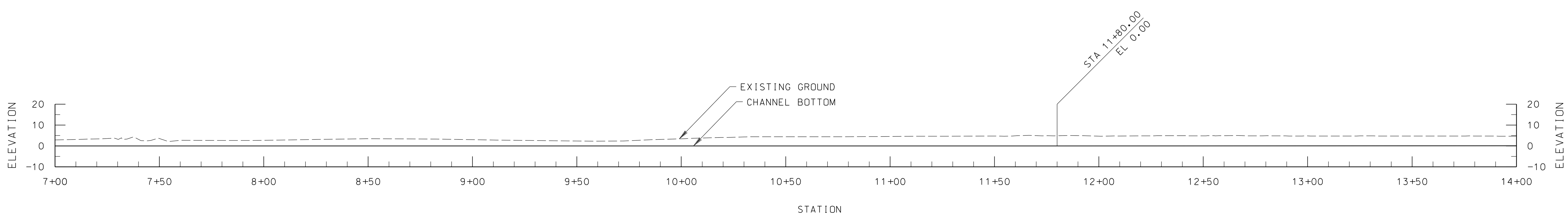
Designed by: D.N.
Dwn by: R.L.H.
Ckd by:
Rev. No. W912EP-04-B-0010
Scale:
Dated: MAY 2003
D.O.FILE NO. 106-38,385

RIO GRANDE DE ARECIBO
ARECIBO, PUERTO RICO
FLOOD CONTROL PROJECT
RIO GRANDE DE ARECIBO
CONTRACT 1
EARTHWORK
SITE PLANS

DRAWING NO.
30/8



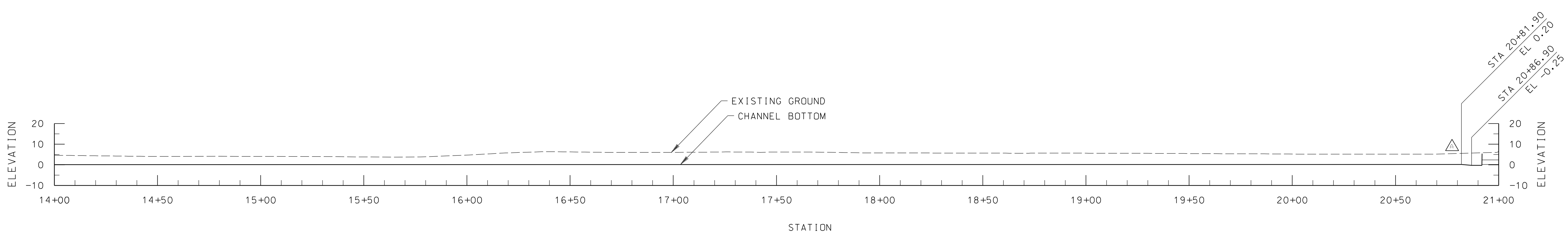
RIO SANTIAGO DIVERSION CHANNEL



RIO SANTIAGO DIVERSION CHANNEL

NOTES:

1. UNLESS OTHERWISE SHOWN, BOTTOM OF CHANNEL SHALL BE LINEAR BETWEEN VERTICAL POINTS OF INTERSECTION.



RIO SANTIAGO DIVERSION CHANNEL

GRAPHIC SCALE

20M 0 20M 40M

US Army Corps of Engineers
Jacksonville District

SAFETY ON THIS JOB DEPENDS ON YOU

No.	Symbol	Zone	Description	Approved
1	△	G1	REVISED TO ACCOMPANY AMENDMENT NO. 0004	

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

Inv. No. W912EP-04-B-0010

Designed by: D.N.

Dwn by: D.N.

Ckd by:

Scale: AS SHOWN

Dated: MAY 2003

D.O.FILE NO. 106-38,385

File name: AREC3202.DGN

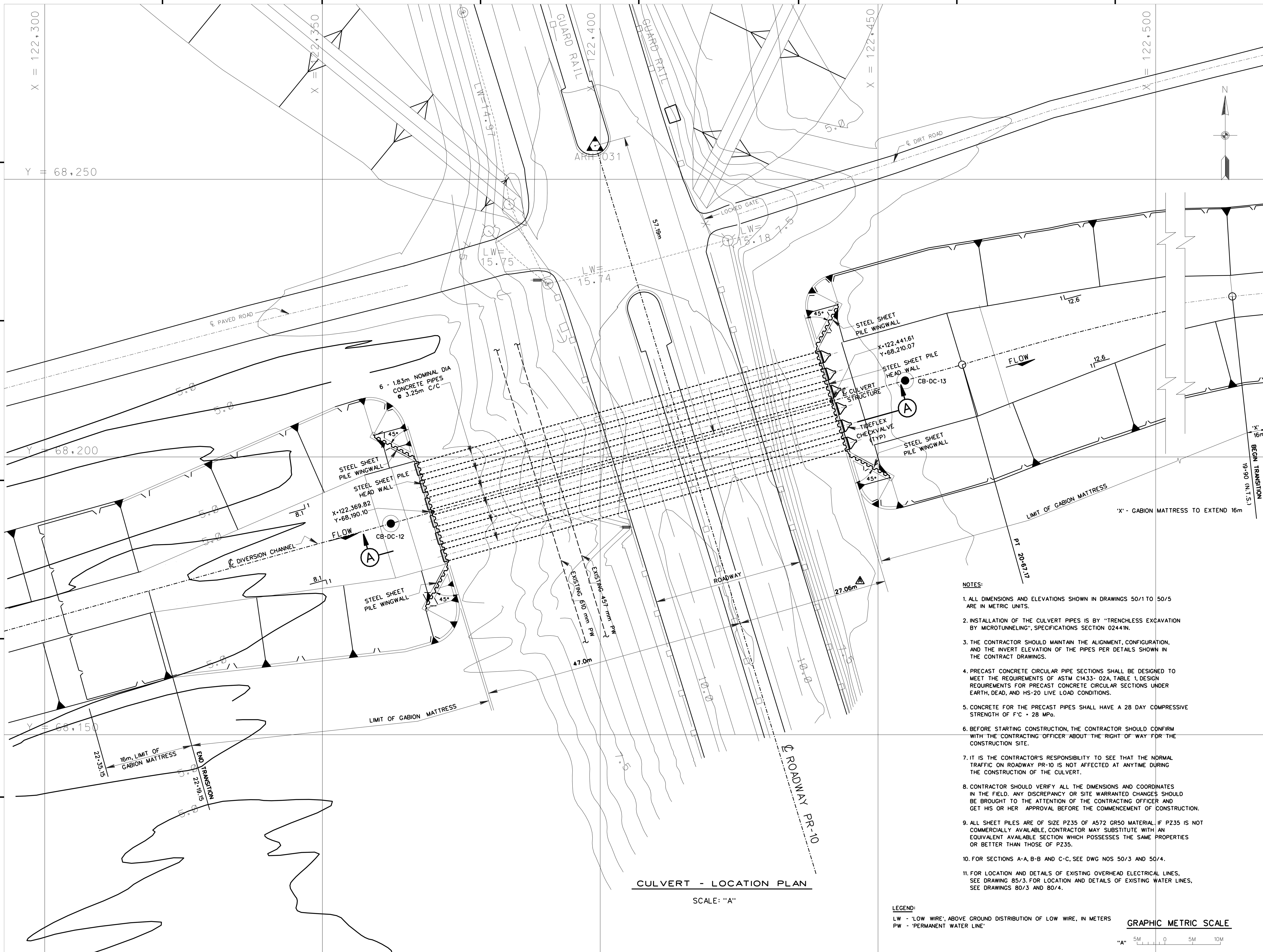
Reference files: ARECBRDR.DGN

????????.DGN

RIO GRANDE DE ARECIBO
ARECIBO, PUERTO RICO
FLOOD CONTROL PROJECT
RIO GRANDE DE ARECIBO
CONTRACT 1
PROFILES AND CROSS SECTIONS
RIO SANTIAGO DIVERSION CHANNEL
PROFILE

DRAWING NO.

32/2



CULVERT - LOCATION PLAN

SCALE: "A"

NOTES:

1. ALL DIMENSIONS AND ELEVATIONS SHOWN IN DRAWINGS 50/1 TO 50/5 ARE IN METRIC UNITS.
2. INSTALLATION OF THE CULVERT PIPES IS BY "TRENCHLESS EXCAVATION BY MICROTUNNELING", SPECIFICATIONS SECTION 02441N.
3. THE CONTRACTOR SHOULD MAINTAIN THE ALIGNMENT, CONFIGURATION, AND THE INVERT ELEVATION OF THE PIPES PER DETAILS SHOWN IN THE CONTRACT DRAWINGS.
4. PRECAST CONCRETE CIRCULAR PIPE SECTIONS SHALL BE DESIGNED TO MEET THE REQUIREMENTS OF ASTM C1433- 02A, TABLE 1, DESIGN REQUIREMENTS FOR PRECAST CONCRETE CIRCULAR SECTIONS UNDER EARTH, DEAD, AND HS-20 LIVE LOAD CONDITIONS.
5. CONCRETE FOR THE PRECAST PIPES SHALL HAVE A 28 DAY COMPRESSIVE STRENGTH OF F'C = 28 MPa.
6. BEFORE STARTING CONSTRUCTION, THE CONTRACTOR SHOULD CONFIRM WITH THE CONTRACTING OFFICER ABOUT THE RIGHT OF WAY FOR THE CONSTRUCTION SITE.
7. IT IS THE CONTRACTOR'S RESPONSIBILITY TO SEE THAT THE NORMAL TRAFFIC ON ROADWAY PR-10 IS NOT AFFECTED AT ANYTIME DURING THE CONSTRUCTION OF THE CULVERT.
8. CONTRACTOR SHOULD VERIFY ALL THE DIMENSIONS AND COORDINATES IN THE FIELD. ANY DISCREPANCY OR SITE WARRANTED CHANGES SHOULD BE BROUGHT TO THE ATTENTION OF THE CONTRACTING OFFICER AND GET HIS OR HER APPROVAL BEFORE THE COMMENCEMENT OF CONSTRUCTION.
9. ALL SHEET PILES ARE OF SIZE PZ35 OF A572 GR50 MATERIAL. IF PZ35 IS NOT COMMERCIALLY AVAILABLE, CONTRACTOR MAY SUBSTITUTE WITH AN EQUIVALENT AVAILABLE SECTION WHICH POSSESSES THE SAME PROPERTIES OR BETTER THAN THOSE OF PZ35.
10. FOR SECTIONS A-A, B-B AND C-C, SEE DWG NOS 50/3 AND 50/4.
11. FOR LOCATION AND DETAILS OF EXISTING OVERHEAD ELECTRICAL LINES, SEE DRAWING 85/3. FOR LOCATION AND DETAILS OF EXISTING WATER LINES, SEE DRAWINGS 80/3 AND 80/4.

LEGEND:

LW - 'LOW WIRE', ABOVE GROUND DISTRIBUTION OF LOW WIRE, IN METERS
PW - 'PERMANENT WATER LINE'

GRAPHIC METRIC SCALE

"A" 5M 0 5M 10M

US Army Corps of Engineers
Jacksonville District

SAFETY ON THIS JOB DEPENDS ON YOU

No.	Symbol	Zone	Description	Approved
1	A	F3	REVISED TO ACCOMPANY AMENDMENT NO 0004	

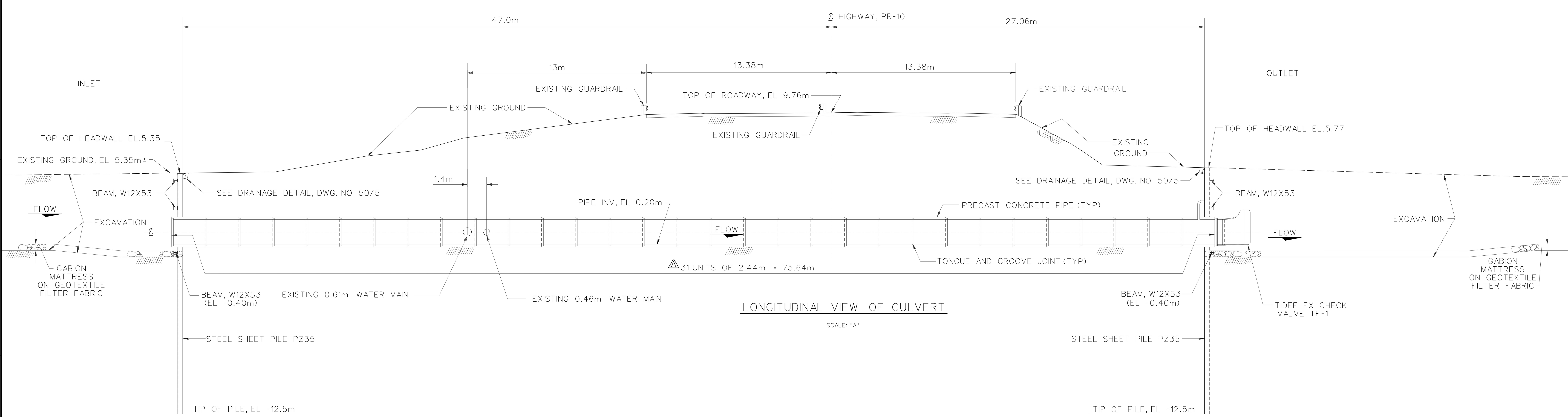
DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

Inv. No. W912EP-04-B-0010
Designed by: V.D.R.
Dwn by: H.R.D.
Ckd by:
Scale: AS SHOWN
Dated: MAY 2003
D.O.FILE NO. 106-38,385

File name: AREC5001.DGN
Reference files: ARECBRDR.DGN
B137-CTL.DGN
B137-DTM.DGN
B137-ELE.DGN
B137-PLN.DGN
C110BRDG.DGN
C110CON.DGN
C110CUL.DGN
C110ELE.DGN
C110PLN.DGN
C110ROAD.DGN

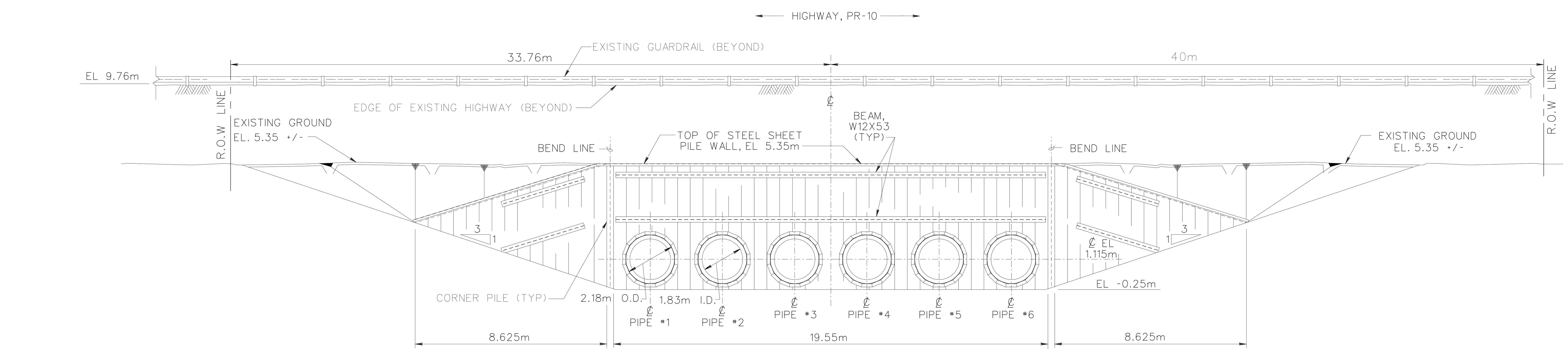
RIO GRANDE DE ARECIBO
ARECIBO, PUERTO RICO
FLOOD CONTROL PROJECT
RIO GRANDE DE ARECIBO
CONTRACT 1
STRUCTURAL
PR-10 CULVERT STRUCTURE
SITE PLAN

DRAWING NO.
50/1



LONGITUDINAL VIEW OF CULVERT

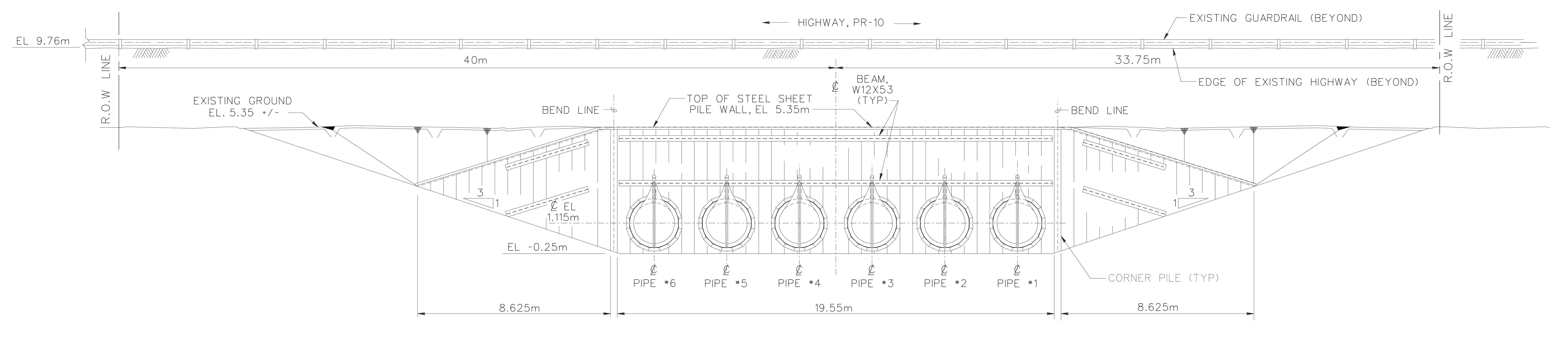
SCALE: "A"



INLET VIEW

SCALE: "B"

(PILES BELOW EL.-0.25 AND BEAM AT EL.-0.40m ARE NOT SHOWN FOR CLARITY)



OUTLET VIEW

SCALE: "B"

(PILES BELOW EL.-0.25 AND BEAM AT EL.-0.40m ARE NOT SHOWN FOR CLARITY)

NOTES:

1. FOR GENERAL NOTES, SEE DWG. 50/1 AND 50/3.
2. FOR SECTIONS, SEE DWG. 50/3, 50/4 AND 50/5.
3. FOR EXISTING WATER MAINS AND THEIR RELOCATION, SEE DWG. 80/4.
4. REFER TO DWG.30/8 FOR LOCATION OF R.O.W.(RIGHT OF WAY) LINES. CONTRACTOR SHOULD CONFIRM THE R.O.W FROM THE CONTRACTING OFFICER BEFORE STARTING CONSTRUCTION.

NOTES ON CHECK VALVES:

1. CHECK VALVES SHALL BE TIDEFLEX "SLIP-ON" TYPE WITH SADDLE SUPPORT, SERIES TF-1, MANUFACTURED BY RED VALVE CO. OR APPROVED EQUAL.
2. CHECK VALVES SHALL BE 'CURVED BILL' TYPE AUTOMATIC CLOSURE VALVES, MADE OF NEOPRENE RUBBER MATERIAL.

SUGGESTED CONSTRUCTION SEQUENCE:

1. CONTRACTOR SHOULD LOCATE FOR THE PRESENCE OF ANY UTILITIES WHICH MAY INTERFER WITH CONSTRUCTION OPERATION. THEY SHOULD BE TEMPORARILY RELOCATED TO FACILITATE CONSTRUCTION.
2. CONTRACTOR SHOULD INSTALL THE PERMANENT SHEET PILE WALL SYSTEM FIRST AT BOTH ENDS TO MAINTAIN STABILITY OF THE EXISTING SOIL UNDERLYING THE HIGHWAY BEFORE PROCEEDING WITH EXCAVATION AND MICROTUNNELING.
3. CONTRACTOR SHOULD TAKE ALL PRECAUTIONS DURING MICROTUNNELING TO PREVENT ANY INSTABILITY OF SHEET PILE WALL SYSTEM.
4. INSTALLATION OF CONCRETE PIPES BY MICROTUNNELING SHOULD BE PER SPECIFICATION.
5. AFTER THE COMPLETION OF CONCRETE PIPE INSTALLATION, TIDEFLEX CHECK VALVES SHOULD BE MOUNTED ON TO THE PIPE ENDS AT THE OUTLET, PER MANUFACTURER'S RECOMMENDATIONS.
6. GROUND SHOULD BE PREPARED BOTH AT INLET AND OUTLET ENDS OF THE CULVERT STRUCTURE PER DRAWING FOR GABION MATTRESS INSTALLATION.

GRAPHIC METRIC SCALES

"A" 2.0M 0 2.0M 4.0M 6.0M

"B" 2.0M 1.0M 0 2.0M 4.0M

US Army Corps of Engineers
Jacksonville District

SAFETY ON THIS JOB DEPENDS ON YOU

No.	Symbol	Zone	Description	Approved
1	A	D5	REVISED TO ACCOMPANY AMENDMENT NO 0004	

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

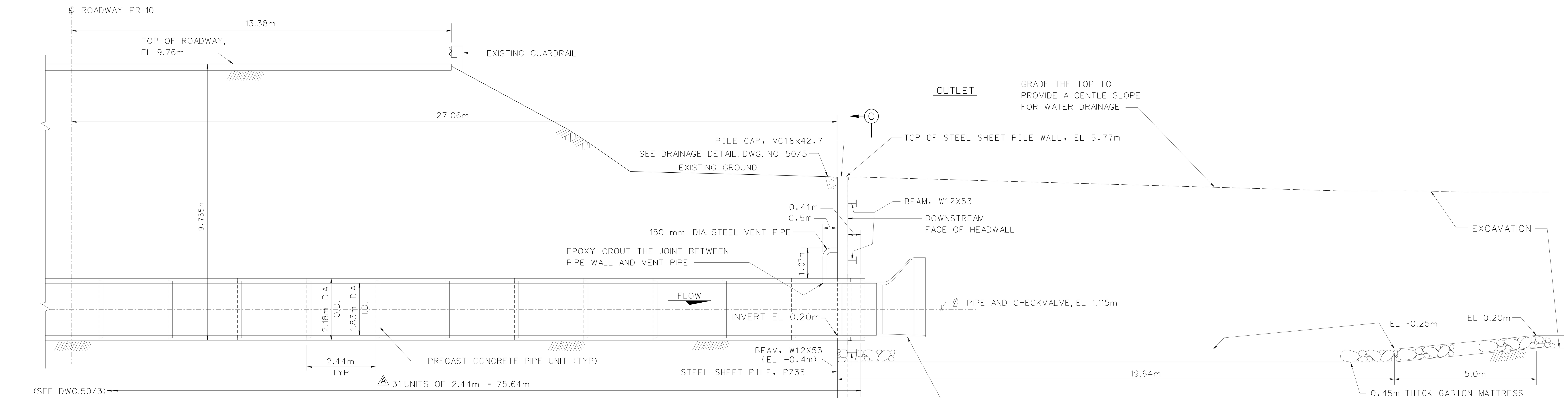
Designed by: V.D.R. | Dwn by: H.R.D. | Ckd by: | Inv. No. W912EP-04-B-0010 | Scale: AS SHOWN | Dated: MAY 2003 | D.O.FILE NO. 106-38,385

File name: AREC5002.DGN | Reference files: ARECBRDR.DGN

RIO GRANDE DE ARECIBO
ARECIBO, PUERTO RICO
FLOOD CONTROL PROJECT
RIO GRANDE DE ARECIBO
CONTRACT 1
STRUCTURAL
PR-10 CULVERT STRUCTURE
GENERAL VIEWS

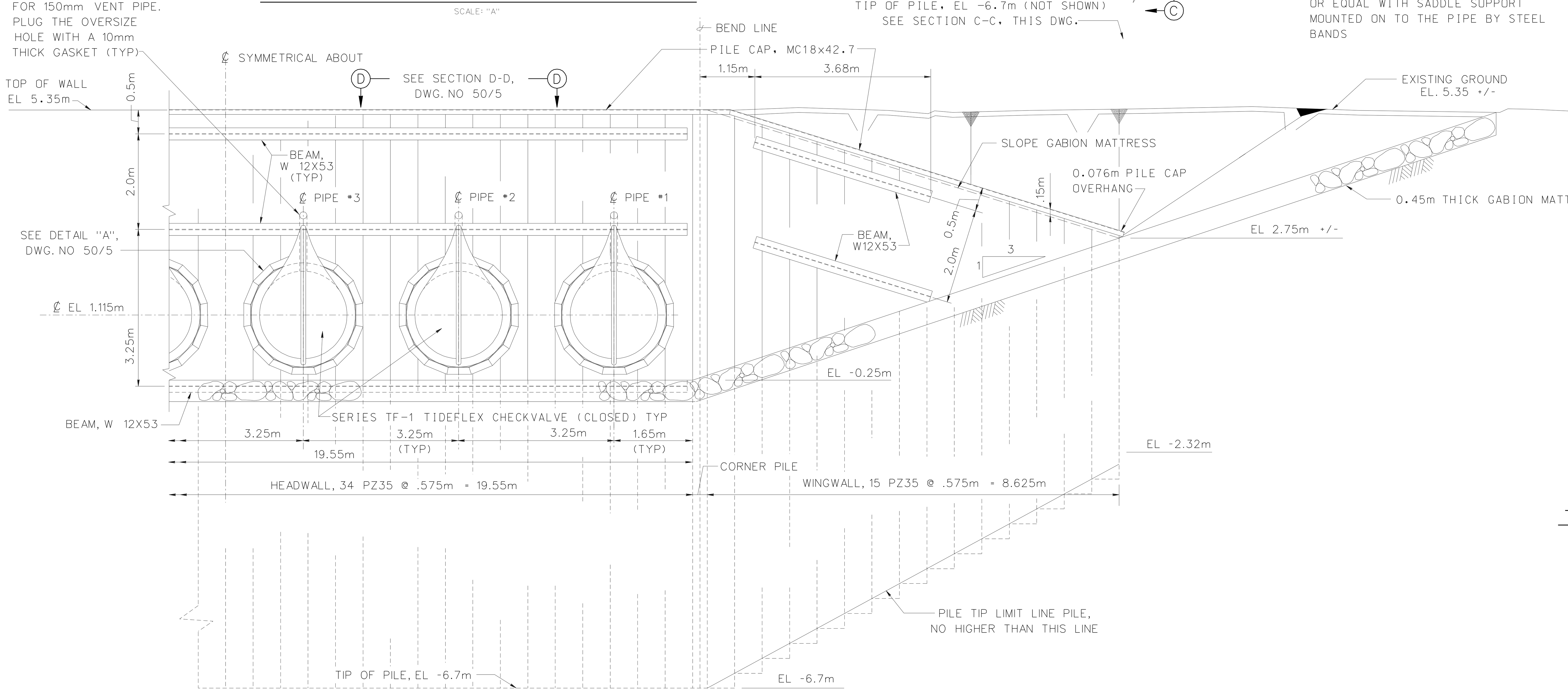
DRAWING NO.
50/2

.../dms00284/arec5002.dgn 09/09/2004 11:17:49 AM



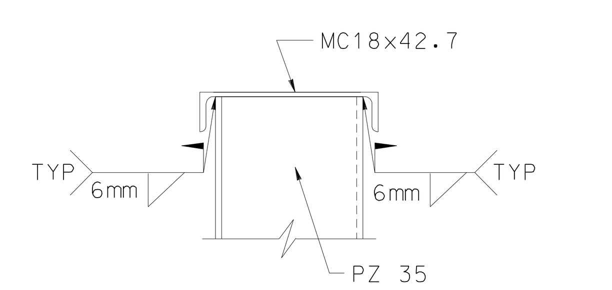
PARTIAL LONGITUDINAL SECTION A-A

SCALE: "A"



SECTION C-C

SCALE: "B"



TYPICAL CONNECTION BETWEEN SHEET PILE AND PILE CAP

NOT TO SCALE

NOTE:

1. FOR LOCATION OF SECTION A-A, SEE DWG. NO 50/1.

2. FOR SECTION D-D, SEE DWG.50/5.

GRAPHIC METRIC SCALES

"A" 1.0M 0 1.0M 2.0M 3.0M

"B" 1.0M 0 1.0M 2.0M

US Army Corps of Engineers
Jacksonville District

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No.	Symbol	Zone	Description	Approved
1	A	B5	REVISED TO ACCOMPANY AMENDMENT NO 0004	

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

Designed by: V.D.R.
Dwn by: H.R.D.
Ckd by:
Reviewed by:
Inv. No. W912EP-04-B-0010
Scale:
File name: ARECS004.DGN
Reference files: ARECBRDR.DGN
Dated: MAY 2003
D.O.FILE NO. 106-38,385

RIO GRANDE DE ARECIBO
ARECIBO, PUERTO RICO
FLOOD CONTROL PROJECT
RIO GRANDE DE ARECIBO
CONTRACT 1
STRUCTURE
PR-10 CULVERT STRUCTURE
SECTIONS

DRAWING NO.
50/4

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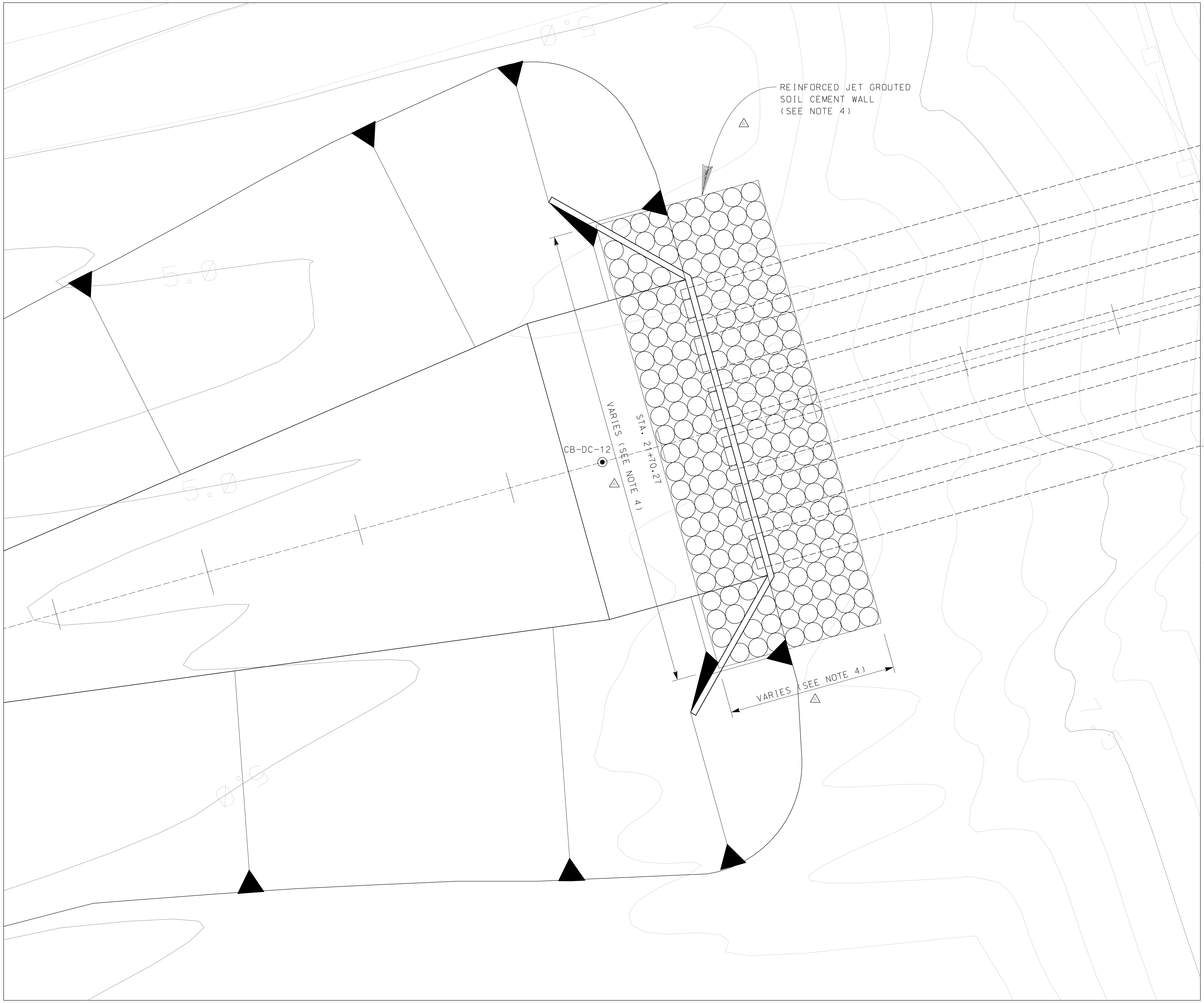


NOTES:

1. A NEWLY INSTALLED SOIL-CEMENT COLUMN SHALL BE ALLOWED TO CURE FOR A MINIMUM OF 12 HOURS PRIOR TO PERFORMING SOIL-CEMENT MIXING WITHIN 16 FEET OF THE NEWLY INSTALLED SOIL-CEMENT.

2. COLUMNS ON THE EMBANKMENT SIDE OF THE SHEET PILE WALL SHALL BE GROUTED FROM ELEVATION 3.0 M TO ELEVATION -24.0 M.

3. COLUMNS ON THE CANAL SIDE OF THE SHEET PILE WALL SHALL BE GROUTED FROM ELEVATION -0.25 M TO ELEVATION -24.0 M.

4. CONTRACTOR SHALL DESIGN THE REINFORCED JET GROUTED SOIL CEMENT WALL AND SUBMIT THE DESIGN ALONG WITH DRAWINGS FOR COR APPROVAL. CONTRACTOR SHALL NOT BEGIN CONSTRUCTION OF THE REINFORCED JET GROUTED SOIL CEMENT WALL UNTIL AFTER COR APPROVAL. REFER TO SPECIFICATIONS SECTION 02465.

GRAPHIC SCALE

2M 0 2M 4M

US Army Corps of Engineers
Jacksonville District

SAFETY ON THIS JOB DEPENDS ON YOU

No.	Symbol	Zone	Description	Approved
3	△	D3,E2 E3	REVISED TO ACCOMPANY AMENDMENT NO. 0004	

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

Designed by: H.K.H. | Dwn by: D.L.N. | Ckd by: | Inv. No. W912EP-04-B-0010 | Scale: | Dated: MAY 2003

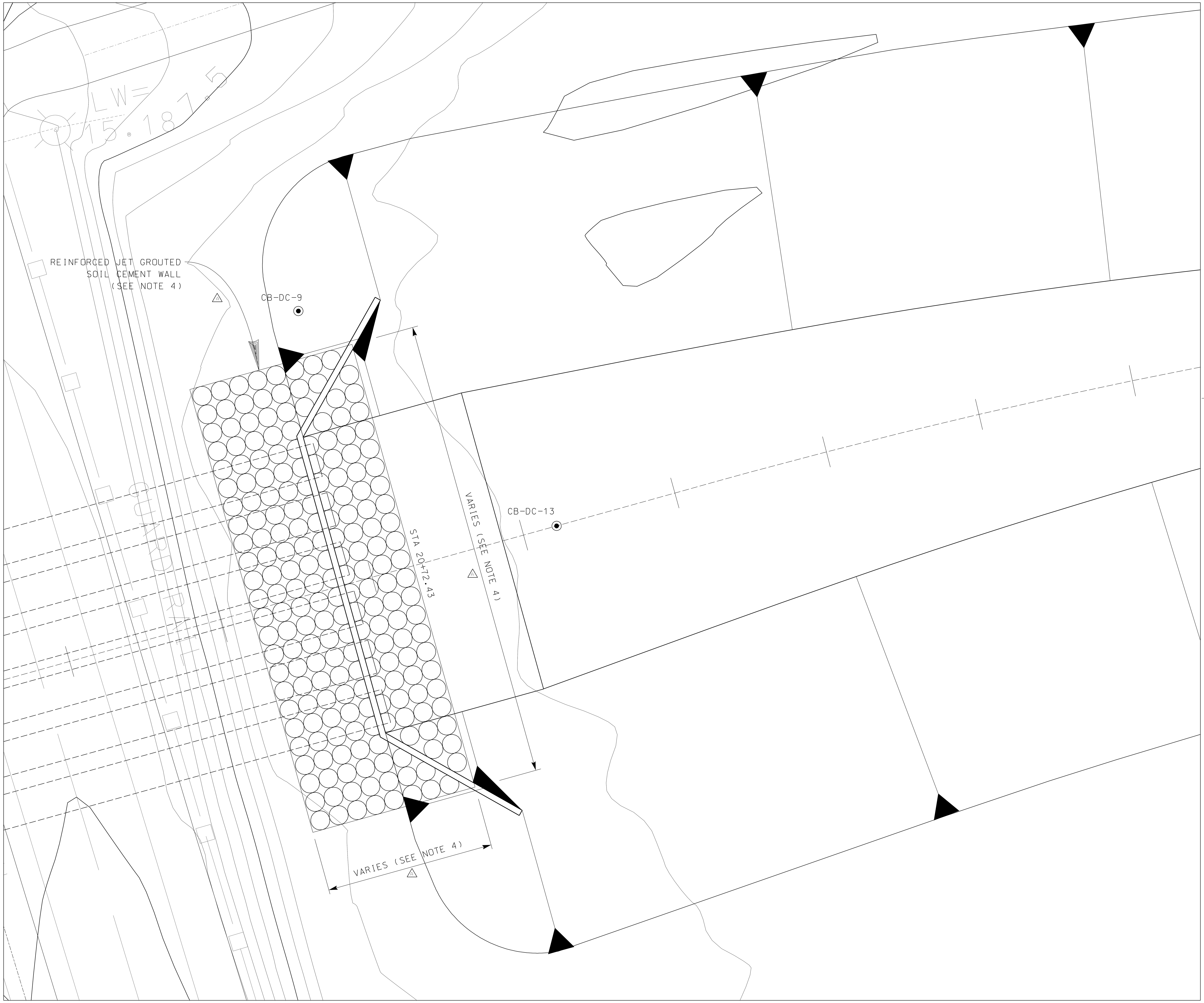
D.O.FILE NO. 106-38,385

File name: AREC6001.DGN

RIO GRANDE DE ARECIBO
ARECIBO, PUERTO RICO
FLOOD CONTROL PROJECT
RIO GRANDE DE ARECIBO
CONTRACT 1
GEOTECHNICAL
PR-10 CULVERTS SOIL IMPROVEMENTS
WEST SITE PLAN

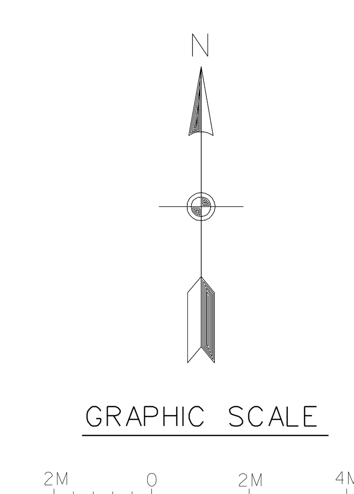
DRAWING NO.
60/1

.../dms03439/arec6001.dgn 09/09/2004 10:00:17 AM



NOTES:

1. A NEWLY INSTALLED SOIL-CEMENT COLUMN SHALL BE ALLOWED TO CURE FOR A MINIMUM OF 12 HOURS PRIOR TO PERFORMING SOIL-CEMENT MIXING WITHIN 16 FEET OF THE NEWLY INSTALLED SOIL-CEMENT.
2. COLUMNS ON THE EMBANKMENT SIDE OF THE SHEET PILE WALL SHALL BE GROUTED FROM ELEVATION 3.0 M TO ELEVATION -10.2 M.
3. COLUMNS ON THE CANAL SIDE OF THE SHEET PILE WALL SHALL BE GROUTED FROM ELEVATION -0.25 M TO ELEVATION -11.7 M.
4. CONTRACTOR SHALL DESIGN THE REINFORCED JET GROUTED SOIL CEMENT WALL AND SUBMIT THE DESIGN ALONG WITH DRAWINGS FOR COR APPROVAL. CONTRACTOR SHALL NOT BEGIN CONSTRUCTION OF THE REINFORCED JET GROUTED SOIL CEMENT WALL UNTIL AFTER COR APPROVAL. REFER TO SPECIFICATIONS SECTION 02465.



US Army Corps of Engineers
Jacksonville District

SAFETY ON THIS JOB DEPENDS ON YOU

No.	Symbol	Zone	Description	Approved
3	A	B5,C1 C3	REVISED TO ACCOMPANY AMENDMENT NO. 0004	

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

Designed by: H.K.H.
Dwn by: D.L.N.
Ckd by:
Inv. No. W912EP-04-B-0010
Scale:
Dated: MAY 2003
D.O.FILE NO. 106-38,385

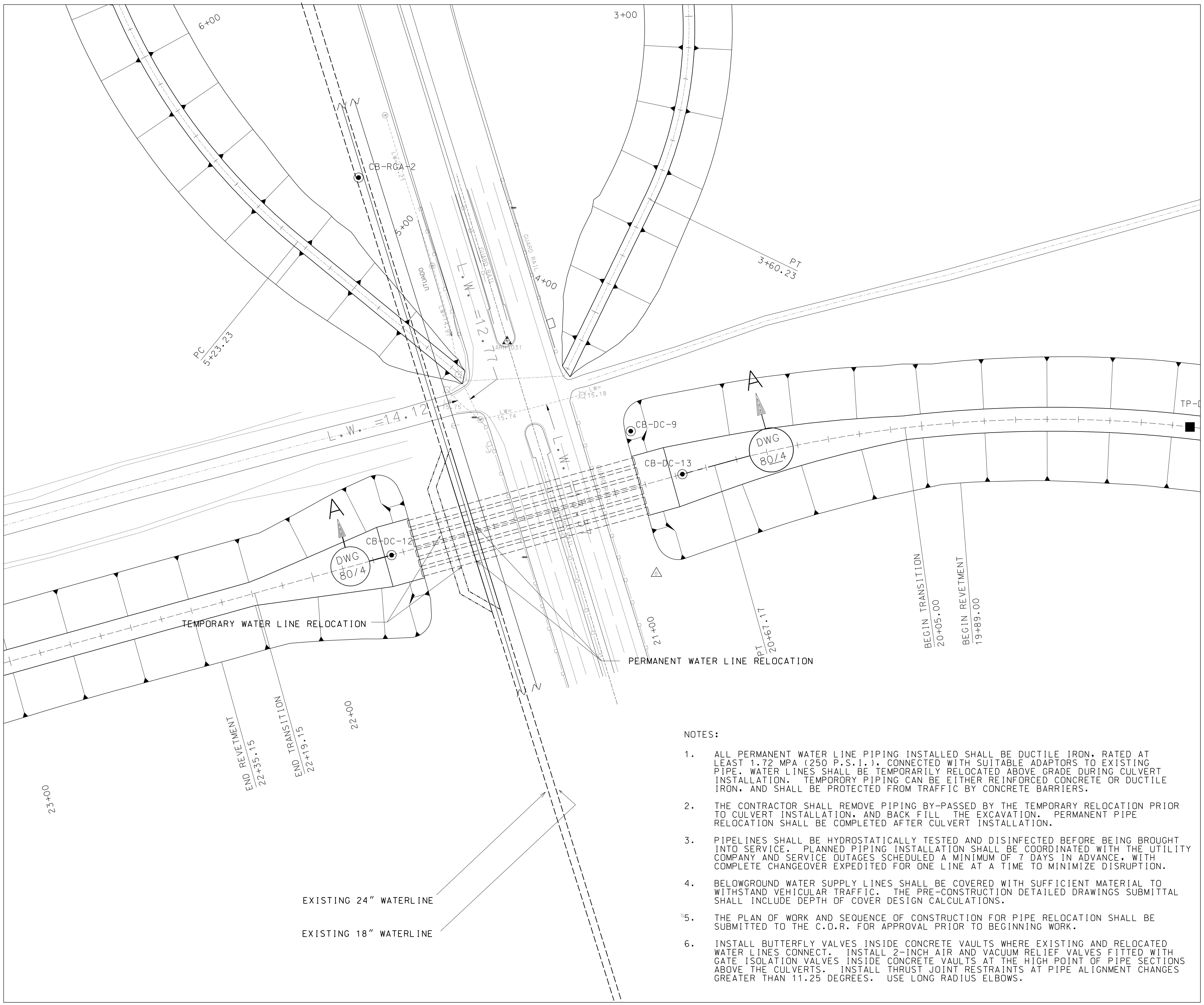
File name: AREC6002.DGN
Reference files: ARECBRDR.DGN AREC SITE.DGN B137-CTL.DGN B137-DTM.DGN B137-PLN.DGN C110CON.DGN C110CUL.DGN C110PLN.DGN C110ROAD.DGN

RIO GRANDE DE ARECIBO
ARECIBO, PUERTO RICO
FLOOD CONTROL PROJECT
RIO GRANDE DE ARECIBO
CONTRACT 1
GEOTECHNICAL
PR-10 CULVERTS SOIL IMPROVEMENTS
EAST SITE PLAN

DRAWING NO.
60/2

.../dms03439/arec6002.dgn 09/09/2004 11:29:49 AM

NOTE:
FOR KEY PLAN SEE DRAWING 80/1



NOTES:

1. ALL PERMANENT WATER LINE PIPING INSTALLED SHALL BE DUCTILE IRON, RATED AT LEAST 1.72 MPA (250 P.S.I.), CONNECTED WITH SUITABLE ADAPTORS TO EXISTING PIPE. WATER LINES SHALL BE TEMPORARILY RELOCATED ABOVE GRADE DURING CULVERT INSTALLATION. TEMPORORY PIPING CAN BE EITHER REINFORCED CONCRETE OR DUCTILE IRON, AND SHALL BE PROTECTED FROM TRAFFIC BY CONCRETE BARRIERS.
2. THE CONTRACTOR SHALL REMOVE PIPING BY-PASSED BY THE TEMPORARY RELOCATION PRIOR TO CULVERT INSTALLATION, AND BACK FILL THE EXCAVATION. PERMANENT PIPE RELOCATION SHALL BE COMPLETED AFTER CULVERT INSTALLATION.
3. PIPELINES SHALL BE HYDROSTATICALLY TESTED AND DISINFECTED BEFORE BEING BROUGHT INTO SERVICE. PLANNED PIPING INSTALLATION SHALL BE COORDINATED WITH THE UTILITY COMPANY AND SERVICE OUTAGES SCHEDULED A MINIMUM OF 7 DAYS IN ADVANCE, WITH COMPLETE CHANGEOVER EXPEDITED FOR ONE LINE AT A TIME TO MINIMIZE DISRUPTION.
4. BELOWGROUND WATER SUPPLY LINES SHALL BE COVERED WITH SUFFICIENT MATERIAL TO WITHSTAND VEHICULAR TRAFFIC. THE PRE-CONSTRUCTION DETAILED DRAWINGS SUBMITTAL SHALL INCLUDE DEPTH OF COVER DESIGN CALCULATIONS.
5. THE PLAN OF WORK AND SEQUENCE OF CONSTRUCTION FOR PIPE RELOCATION SHALL BE SUBMITTED TO THE C.O.R. FOR APPROVAL PRIOR TO BEGINNING WORK.
6. INSTALL BUTTERFLY VALVES INSIDE CONCRETE VAULTS WHERE EXISTING AND RELOCATED WATER LINES CONNECT. INSTALL 2-INCH AIR AND VACUUM RELIEF VALVES FITTED WITH GATE ISOLATION VALVES INSIDE CONCRETE VAULTS AT THE HIGH POINT OF PIPE SECTIONS ABOVE THE CULVERTS. INSTALL THRUST JOINT RESTRAINTS AT PIPE ALIGNMENT CHANGES GREATER THAN 11.25 DEGREES. USE LONG RADIUS ELBOWS.

N

GRAPHIC SCALE

10M 0 10M 20M

US Army Corps of Engineers
Jacksonville District

SAFETY ON THIS JOB DEPENDS ON YOU

No.	Symbol	Zone	Description	Approved
1	△	D3	REVISED TO ACCOMPANY AMENDMENT NO. 0004	

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

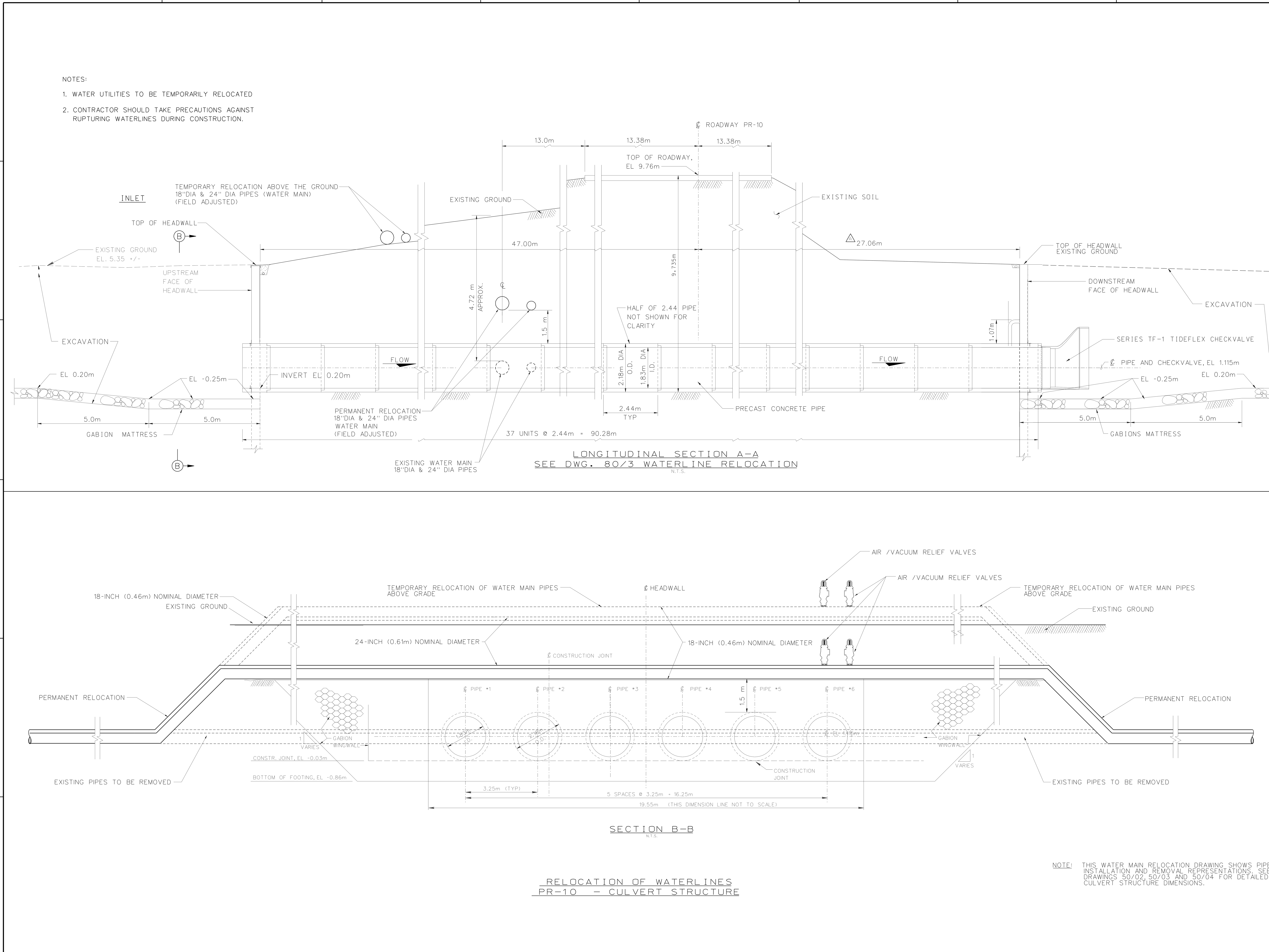
Designed by: R. RMNATH
Dwn by: D.S.
Ckd by:
Inv. No. W912EP-04-B-0010
Scale: AS SHOWN
Dated: MAY 2003
D.O. FILE NO. 106-38,385

File name: arec8003.dgn

RIO GRANDE DE ARECIBO
ARECIBO, PUERTO RICO
FLOOD CONTROL PROJECT
RIO GRANDE DE ARECIBO
CONTRACT 1
MECHANICAL
WATERLINE RELOCATION AT INTERSECTION OF
SAN FRANCISCO STREET AND NEW PR-10

DRAWING NO.
80/3

.../dms00285/arec8003.dgn 09/09/2004 09:43:32 AM



US Army Corps of Engineers
Jacksonville District

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Symbol	Zone	Description	Approved
1	F5	REVISED TO ACCOMPANY AMENDMENT NO. 0004	

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

Designed by: R. RAMNATH
Dwn by: O.S.
Ckd by:
Scale: AS SHOWN
Dated: MAY 2003
D.O.FILE NO. 106-38,385

RIO GRANDE DE ARECIBO
ARECIBO, PUERTO RICO
FLOOD CONTROL PROJECT
RIO GRANDE DE ARECIBO
CONTRACT 1
MECHANICAL
WATERLINES RELOCATION AT INTERSECTION
OF SAN FRANSICO STREET AND NEW PR-10

DRAWING NO.
80/4

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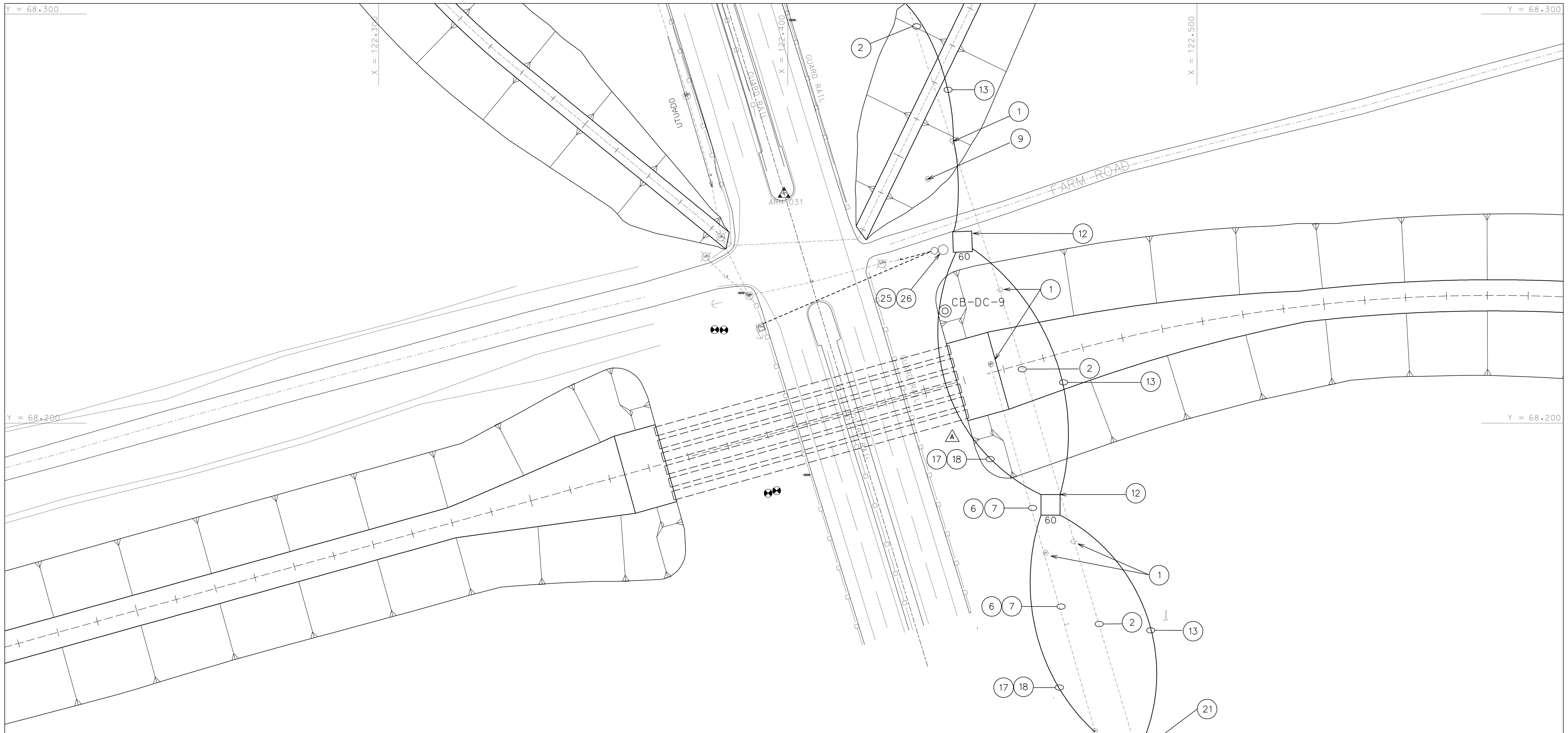
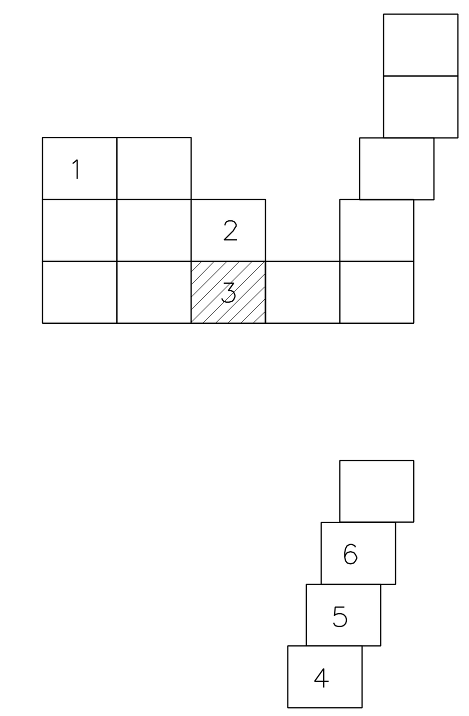
MATCH LINE DWG. NO. 85/2



KEYED NOTES

1. REMOVE UTILITY POLE AND POLE MOUNTED EQUIPMENT
2. REMOVE THREE PHASE POWER DISTRIBUTION LINE
3. REMOVE SECONDARY POWER UTILITY LINE
4. REMOVE SECONDARY POWER SERVICE DROP
5. REMOVE STREET LIGHT CIRCUIT
6. REMOVE COPPER TELEPHONE UTILITY LINE
7. REMOVE FIBER OPTIC TELEPHONE UTILITY LINE
8. REMOVE CATV COAX UTILITY LINE
9. REMOVE GUY POLE
10. REMOVE SINGLE PHASE POWER DISTRIBUTION LINE
11. REMOVE SINGLE PHASE POWER TRANSFORMER
12. PROVIDE NEW CONCRETE UTILITY POLE. POLE HEIGHT IS AS NOTED ON SYMBOL
13. PROVIDE THREE PHASE POWER DISTRIBUTION LINE
14. PROVIDE SINGLE PHASE POWER DISTRIBUTION LINE
15. PROVIDE SECONDARY POWER LINE
16. PROVIDE STREET LIGHT CIRCUIT
17. PROVIDE COPPER TELEPHONE UTILITY LINE
18. PROVIDE FIBER OPTIC TELEPHONE UTILITY LINE
19. PROVIDE CATV COAX UTILITY LINE
20. CONNECT SINGLE PHASE POWER DISTRIBUTION LINE TO EXISTING THREE PHASE POWER DISTRIBUTION LINE
21. CONNECT NEW THREE PHASE POWER DISTRIBUTION LINE TO EXISTING THREE PHASE POWER DISTRIBUTION LINE
22. CONNECT SECONDARY VOLTAGE POWER LINE TO EXISTING SECONDARY VOLTAGE POWER LINE
23. CONNECT NEW SINGLE PHASE POWER DISTRIBUTION LINE TO NEW THREE PHASE POWER DISTRIBUTION LINE
24. CONNECT NEW SINGLE PHASE POWER DISTRIBUTION LINE TO EXISTING SINGLE PHASE POWER DISTRIBUTION LINE
25. CONNECT NEW COPPER TELEPHONE LINE TO EXISTING TELEPHONE LINE
26. CONNECT NEW FIBER OPTIC TELEPHONE LINE TO EXISTING FIBER OPTIC TELEPHONE LINE
27. CONNECT NEW CATV COAX LINE TO EXISTING CATV COAX LINE
28. INSTALL RELOCATED SINGLE PHASE POLE MOUNTED POWER TRANSFORMER AND TERMINATE PRIMARY AND SECONDARY CONDUCTORS



SHEET INDEX

LEGEND

UT	EXISTING UNDERGROUND TELEPHONE LINE
UP	EXISTING UTILITY POLE
	EXISTING POWER POLE
	EXISTING LIGHT POLE
	EXISTING POLE SUPPORT
T	EXISTING TELEPHONE MANHOLE
60	NEW CONCRETE UTILITY POLE PER PREPA STANDARDS. NUMERIC DESIGNATION INDICATES POLE HEIGHT FROM BUTT TO TOP.
	NEW OVERHEAD UTILITY LINE TYPE AS NOTED BY KEYED NOTES.
	EXISTING TELEPHONE RISER
	EXISTING UTILITY LINE. TYPE NOTED IN KEYED NOTE. LINES NOT ANNOTATED BY KEYED NOTES ARE FOR INFORMATION ONLY AND ARE NOT TO BE DISTURBED.

N

GRAPHIC SCALE

10M 0 10M 20M

US Army Corps of Engineers
Jacksonville District

SAFETY ON THIS JOB DEPENDS ON YOU

No.	Symbol	Zone	Description	Approved
1	A	E4	REVISED TO ACCOMPANY AMENDMENT NO. 0004	

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

Designed by: D.N.
Dwn by: R.L.H.
Ckd by:
Inv. No. W912EP-04-B-0010
Scale: AS SHOWN
Dated: MAY 2003
D.O.FILE NO. 106-38,385

File name: arecE8.dgn
Reference files: ARECBRDR.DGN ARECSITE.DGN B137-CTL.DGN B137-DTM.DGN B137-ELE.DGN B137-PLN.DGN C110BRDG.DGN C110CON.DGN C110CUL.DGN C110ELE.DGN C110PLN.DGN C110ROAD.DGN

RIO GRANDE DE ARECIBO
ARECIBO, PUERTO RICO
FLOOD CONTROL PROJECT
RIO GRANDE DE ARECIBO
CONTRACT 1
ELECTRICAL
UTILITIES RELOCATION

DRAWING NO.
85/3

.../dms00279/arec8503.dgn 09/09/2004 10:34:26 AM